American Machinist

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New York, December 11, 1930

THE BASIC NECESSITIES UNDERLYING EDUCATIONAL ORDERS

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THE LAST WAR left a bad taste in the mouths of all the peoples concerned. History, which is either "a fable agreed upon" or the naked truth, as one agrees with it or not, will probably reveal that, of all the allied nations, only two went into, and came out of the war, with shields untarnished. This will not be forgiven for many decades. It took fifty years and two foreign wars to reconcile the North and the South, and the victor has been just as bitter as the vanquished.

In our country the Great War left industry disgruntled because of the methods used in final settlements. It left shop executives unsympathetic because they were the victims of the unbusinesslike methods of the government, and it left the government itself discouraged with the inefficiency, wastefulness, and cupidity of industry. Labor thought it was being exploited; soldiers believed they were treated unfairly. When we add to these the taxpayers who believed that money was being wasted instead of spent, we have included the entire adult population.

It is estimated by Mr. Baruch that of the 30 billions of dollars spent, only about 8 billions were spent on military projects useful to the prosecution of the war. We are not interested in fighting that phase over again, but we are distinctly interested in learning something from the lessons so dearly bought, something that will prevent repetitions. And the only way to find out is through peacetime educational orders on a scale that will be indicative of efficiency or failure.

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"we are at present accumulating a host of problems that, without educational orders, cannot be solved until another war breaks out, and then, at what cost!"

"As a major objective, the steel and materials situation should be clarified and systematized."

"One of the inexcusable tragedies of the war was the cost-plus method of payment . . ."

"the initial orders for war material should be prepared, and their sequence fixed at least in advance of a war."

"Surely the 'three men' upon whom the man at the front depends should be trained also."

"at no time since the war has such a favorable opportunity for trying out educational orders presented itself."

It does not pay to fool ourselves. The prime causes of the 22-billion-dollar waste were the lack of educational appropriations previous to the war, failure to observe the methods we used in manufacturing munitions for foreign countries and failure to profit by the mistakes. The next was the cost-plus contract. On the side of industry was the weakness of even big organizations when called upon to face an emergency, and in others the desire to unload real estate, to acquire expensive buildings at government expense. Labor also had its incompetent leaders like the government, and its dishonest ones like industry. Some of these reasons still obtain.

No problem is really difficult if analyzed at leisure, its constants placed to one side and forgotten, and the path of its variables plotted. The over-equipped, over-expanded conditions caused by war orders have passed away. Much of the war-time data covering management, materials, and equipment of industry is obsolete and must be modified. Better management, materials, machine tools, and cutting tools have been devised since the war.

In addition thereto, we have devel-

oped improved accuracies in measurement, new standards of tolerance, greater refinement in heat-treatment, new methods of manufacturing jigs and fixtures. More important still, we have a simpler technique of drafting. All these things mean either a better product or a cheaper one. Where the line between necessary refinement and mass production efficiency lies, can only be determined by using mass production methods at a time when interruptions are not vital, when "emergency" cannot be made the excuse for poor work.

Either through policy or expediency we are at present accumulating a host of problems that, without educational orders, cannot be solved until another war breaks out, and then, at what cost! For just one example, anti-aircraft guns and devices are crying for development on a manufacturing basis. So many of them are necessary that they cannot be built individually.

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"It is interesting in placing educational orders to know just how many men will be educated . . ."

"Of every million dollars spent, $600,000 will go to indirect labor and overhead, $400,000 to direct labor and material."

"$400,000 . . . will keep 2,748 men busy for one month . . . the greatest part of material cost is labor . . . the 150 per cent overhead also employs men . . . the total, then, for $1,000,000 would be over 4,000 men employed for one month. One hundred million dollars would employ 135,000 men for three months."

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During the war, inspection was so inflexible on one hand and so much a matter of personal opinion on another that it was a scandal. This was the only factor that reputable firms found necessary to "fix" directly or indirectly in order to avoid stoppage of work. The inspector was the "man on horseback," the autocrat of the war, and the bill was paid in human lives. It should never happen again. Newly developed methods of automatic gaging, new methods of test and inspection technique should be studied and incorporated into the specifications. This can be done only through educational orders, issued at least every five years regardless of whether or not conditions are as favorable for their placing as at present. Tolerances for mass production cannot be based upon arsenal practice; they must be determined through actual mass production.

The degree of finish was also a matter of much acrimonious discussion. Officers accustomed to the exhibition finish, produced by arsenals, demanded the same finish in mass production. The requirements were modified, but the modifications did not reach back to the specifications. Many things were modified, but in many instances the modifications caused even more confusion. Only mass production tests can show whether these modifications were ever incorporated into the specifications.

Steel

As a major objective, the steel materials situation should be clarified and systematized. During the war some grades of steel were specified that could not be procured in quantity; others were specified without any regard to machineability. Ultimately it was even necessary to utilize cast ingots for making shells instead of rolled billets. Not necessarily the best steel should be used for mass production purposes, but the most machineable, steel that will answer the purposes designed for and that can be procured in sufficient quantities. Steels used should be as few in number as possible. Then too, military engineers may fall into the popular error that the new tungsten-carbide tool will machine any kind of metal in any condition and at any rate within the capacity of the machine. This is a safe presumption as regards cast iron and non-ferrous metals, but with steel, the question can only be settled and improvement made by machining actual war material in continuous mass production. Hard steel furnished for various uses was an irritant to the manufacturer and the man who was getting paid piece rates for doing the work. A remedy is essential.

The substitution of built-up welded shapes for steel castings, copper welding in a hydrogen atmosphere, new methods of centrifugal casting all hold forth possibilities that can only be tested by substantial ordering.

One of the inexcusable tragedies of the war was the cost-plus method of payment, inexcusable because its iniquities were written upon its face. It placed a premium upon inefficiency and graft; its only recommendation was that it saved someone, the supplier, the bother of making an estimate, and the government the worry of checking it. Methods of time study and cost keeping have kept pace with mechanical improvements, and there is no longer any excuse for eliminating estimating and checking. The government must be willing to place educational orders large enough to get accurate standard times, to which differentials may be added to meet conditions.

Census

This magazine believes itself justified in spending thousands of dollars to take a census of machine tools every five years. The government believes the same about taking the Census of Manufactures every two years. Both recognize the futility of theorizing—only actual conditions are valuable. How much more necessary is it that the government also check the progress in production methods every five years or less by collecting data based upon educational orders?

Slipshod methods of placing orders caused much confusion in final settlements following the war. Orders were placed and accepted orally in good faith based upon promises of later confirmations which, for a number of reasons, were never made. Payments were made for deliveries. All went well until normality emerged from confusion, and manufacturers were unable to show orders for the work they were doing. They were even, in some cases, unable to remember the source of the order. The training of a child should begin thirty years before its birth; the initial orders for war material should be prepared, and their sequence fixed at least in advance of a war. Just as soon as one educational period has been tested, the orders for the next one should be made out by the War Department and released by Congress. This policy would be in line with fleet operations, army maneuvers, training camps, and other means of training. Surely the "three men" upon whom the man at the front depends should be trained also.

As has been pointed out, at no time since the war has such a favorable opportunity for trying out educational orders presented itself. The fact that these orders, if released now, would mitigate unemployment is only one more good reason for releasing them.

It is, furthermore, vitally important to give labor a

personal interest in national defense. Because of the nature of his work, a mechanic or mechanical executive cannot attend citizens' training camps. During the war, it will be remembered, much delay was caused by labor trouble because labor did not realize the seriousness of the situation or just what war required of it. Just as soon as real manufacturing began there was no further trouble. Educational orders would furnish this personal interest element. It may not be possible in the next war to borrow so much equipment from our allies; it is even conceivable that we shall have no allies.

It is understood that a corps of officers is making a survey of manufacturing plants that can supply war material on an emergency basis. It is natural that the sales instinct, and possibly some imagination will enter into any statements made by the manufacturer. It will be done in good faith, and with no thought of deceiving, because in case of war he could and would—eventually—do what he promises; but any data not checked by an educational order is of doubtful value. Just as we mobilize our military organization, let us mobilize the workers upon whom the military organization is dependent.

There are different kinds and grades of war orders; those in which time is vital and cost secondary, those in which quality and accuracy are secondary to cost, and finally those routine orders where cost, quality, and time are equally important. Naturally any class three article may at first be in class one, and its cost easily double. This should not fix its final price, and a fair evaluation can only be fixed by educational orders.

Right now, it is interesting in placing educational orders to know just how many men will be educated, what proportion will go to indirect labor, and what to direct labor, and material, which also represents labor.

During the war some firms placed 150 per cent overhead upon labor costs. This was less than their normal overhead, but it was felt that inasmuch as there were no sales costs, and war material was distinct from their other work, it was fair. Overhead is a subject upon which no two people agree; it needs further clarification. The 150 per cent overhead figure, however, will serve well enough for the example given below.

Of every million dollars spent, $600,000 will go to indirect labor and overhead, $400,000 to direct labor and material.

On most of the work done in the metal trades industry, wages run from about 55 cents to $1.00 an hour, the average being 70 cents.

In round numbers $400,000 represents 571,500 man-hours; it will keep 2,748 men busy for one month. We have ignored material costs for two reasons: first because it forms but a small percentage of the total cost, and second, because the greatest part of material cost is labor. With steel, for instance, men must dig the ore; other men smelt, and still other men roll it. There are no middlemen in the metal industry and should not be in any other branch of war supply industry.

The 150 per cent overhead also employs men—draughtsmen, inspectors, supervisors, clerks, accountants; in some plants toolmakers are included in the overhead. Adding to these maintenance men, sweepers, etc., it is probably fair to state that overhead gives employment to half as many people as are employed in direct labor. The total, then, for $1,000,000 would be over 4,000 men employed for one month. One hundred million dollars wisely spent in educational orders would employ 135,000 men for three months on full time.

TYPICAL INDORSEMENTS BY PROMINENT MANUFACTURERS

Widely Distributed Geographically

Newton Upper Falls, Mass.

The proposal of having Congress adopt a bill providing authority for the Secretary of War to place educational orders for equipment, munitions, and accessories needed in the military service with commercial concerns, has my hearty endorsement.

Such an action is sound in my opinion not only from the standpoint of giving employment to the many thousands requiring assistance, but also in respect to the steps the government should take in keeping the sources of supply adequately experienced and the country ready to act whenever the occasion may demand it.

V. C. STANLEY, President of
THE GAMEWELL COMPANY,
THE HOLTZER CABOT ELECTRIC CO.,
ROCKWOOD SPRINKLER CO. OF MASS.,
ROCKWOOD SPRINKLER CO. OF ILL.,
WORCESTER FIRE EXTINGUISHER CO., LTD. (Canada),
EAGLE SIGNAL SALES CORP. (Moline, Ill.).

Worcester, Mass.

Your letter of 24th November, enclosing a reprint of Col. Payne's article in the 20th November *American Machinist*, on the subject of Educational Orders for Munitions as Unemployment Relief, has been received.

We are of the opinion that the plan is most excellent and beyond doubt entirely sound. In this time of stress, any scheme for taking care, even partially, of skilled hands out of work, is laudable; one such as Col. Payne's, which will surely result in direct benefit to our National Government, merits the most serious attention.

MORGAN CONSTRUCTION COMPANY,
PAUL B. MORGAN, President.

There is no question but what the suggestion made in your letter of November 25th relative to the placing of educational munition orders in private plants would at this time prove a very desirable move.

Most plants undertaking the building of munitions will not only provide the actual work in building the material, but will have to start back further than that, namely the making of the necessary tools and fixtures. In many cases they will have to purchase suitable equipment to carry on the necessary mechanical operations.

This not only directly benefits the labor involved in operating the machinery in the munition manufacturing plants but also indirectly the machine tool industry who are called upon to furnish the metal working equipment both standard and special necessary to perform the operations, where the plant hasn't the proper equipment available now.

We believe the plan is not only very sound from the unemployment angle, but also from the fact that the various plants undertaking the building of munitions gain the experience in their manufacture which is so necessary.

LELAND-GIFFORD CO.,
S. B. DOWD, Sales Manager.

Greenfield, Mass.

We heartily endorse congressional authorization of educational orders for ordnance material. At this particular time it will afford unemployment relief to many machinists and tool makers, but it is of still greater value in furthering the preparedness program. GOODELL-PRATT COMPANY,
W. M. PRATT, President.

New Britain, Conn.

We have your letter of November 25th together with reprint from *American Machinist*, headed "Educational Orders as Unemployment Relief" and wish to advise that we are heartily in accord with the legislation proposed.

It is our belief that immediate steps should be taken to have such legislation approved and made law, for this will not only relieve to some extent, the unemployment situation, but the major importance in our minds is that this will acquaint the manufacturers with what is required in time of emergency. Although increased cost is referred to, nevertheless, it is our opinion that the increases incurred under the educational orders will be more than offset during an emergency period.

THE GOSS & DE LEEUW MACHINE CO.,
A. J. CROZIER, Assistant Treasurer.

Torrington, Conn.

We have your letter of the 24th inst. bringing attention to the problem of unemployment relief as it affects particularly the metal working trades, and the project you are sponsoring in the way of educational orders to be placed by the War Department for munitions with private industries.

We believe that this proposition is timely as well as meritorious. Employment is needed for men out of work with little likelihood of getting it to any extent this winter, and where an agency such as the government is in a position to furnish work which has the added advantage of being, as you say, educational in character, then money so appropriated is both wisely and profitably spent.

The only way to prove any plan is to put it in operation, and we hope it will be done in this case.

THE HENDEY MACHINE COMPANY,
F. N. McKENZIE, Secretary.

New Haven, Conn.

Much as I deplore any action that savors of preparation for war, I am not foolish enough to believe that the country should sit idly by and give no thought to eventualities that might lead to war. Therefore, it seems to me that the plan for placing educational orders with various industries throughout the country to prove their ability as producers of war material is worth while and should be supported by the next Congress. If American industry is to be expected to produce war material, it should have a chance to try its wings before an emergency arises. That can only be accomplished by having actual orders for war material that it may execute. With industry in its present state, and unemployment such a problem, there could be no better time than now to see what we can do.

I shall be glad to give these views to our representatives in Congress at the proper time.

THE GEOMETRIC TOOL COMPANY,
JAMES W. HOOK, President.

Albany, N. Y.

Referring to your letter of the 24th inst. with reference to the placing of "Educational Munition Orders":

I am quoting herewith copy of letter I am today sending to our Congressman, Honorable Parker Corning of Albany:

"We favor the passage of a bill for the placing of so-called "educational orders" for munitions with private industry. It appears to be an ideal time for the placing of such orders for the following reasons:

1. It would to a certain degree relieve the unemployment situation.
2. It would enable manufacturers to do experimental work in dull times. They would then be prepared to go ahead on short notice in case of emergency.
3. Modern industry is not familiar in times of peace with munitions manufactured. The placing of these "educational orders" would unquestionably add to national preparedness."

CONSOLIDATED CAR-HEATING COMPANY, INC.,
CORNELL S. HAWLEY, President.

Rochester, N. Y.

We are much interested in your quotation "Educational Orders as Unemployment Relief" and also feel that the ability to quickly get out equipment of the kind mentioned is very important and commend you for your work in this direction.

DAVENPORT MACHINE TOOL CO.,
W. S. DAVENPORT, Pres. and Gen. Mgr.

Pittsburgh, Pa.

I feel you are to be congratulated on the stand you have taken in endeavoring to secure legislation to permit the placing of educational orders for munitions by the Secretary of War. Every business man who studies the question of industrial preparedness is convinced that the benefit from such educational orders to the government, in promoting preparedness, is worth many times their cost.

The placing of such orders at this time will not only provide some additional work, as you suggest, for an important class of our citizens who will not be benefited by other relief measures, but will also enable each manufacturer who takes on such an order to make a much more careful and detailed study of methods and costs of production than could be done in times of greater business activity. EDGEWATER STEEL COMPANY,
FRANK B. BELL, President.

Cleveland, Ohio

Your suggestion that the War Department be permitted, through proper Congressional authority, to place educational munition orders in private plants at this time, impresses me as being extremely constructive.

There is no more proper place to rest the burden of providing for unemployment than upon the public at large, and it would seem particularly appropriate, at this time, to undertake this educational order plan, which has been in contemplation for some time. It would seem that there would be an added advantage in having such educational orders handled at a time when shops are not busy and when key men could concentrate, individually and in groups, upon the problems surrounding the various types of munition that might be allocated to them.

I wish to congratulate you upon the initial thought in the matter and trust that it will be successful.

THE NATIONAL ACME COMPANY,
F. H. CHAPIN, President.

Toledo, Ohio

I note your query dated November 24th as to our reaction in regard to the proposal to allow the Ordnance Department to place educational orders.

We have been greatly interested in this proposal for several months back, and are thoroughly convinced that the project is one that should be carried out with as little delay as possible.

The writer remembers very thoroughly the complete lack of knowledge and experience that was available at the time we entered the World War. Not only were the manufacturers' plants without knowledge but there was practically no one who was competent to tell the multitude of manufacturers what was wanted in an accurate and definite way. It is a serious matter to enter into the manufacture of parts that are as complicated and as accurate as are required by the Ordnance Department, and no one can do work of this nature intelligently until after a period of training.

The need for these educational orders is particularly stressed now because of our economic depression. Even a limited number of orders would provide work for skilled craftsmen, a class that, after all, is probably the hardest hit in this depression since substitute work is difficult to obtain.

Any action that would lead to the establishment of the necessary authority by Congress is worthy of support.

THE ACKLIN STAMPING COMPANY,
JAMES M. ACKLIN, President.

Cincinnati, Ohio

Your favor of the 25th to hand and in reply would say we think you have done some very good thinking that will be for the benefit of everyone concerned.

Now is the time for the Assistant Secretary of War to place educational munition orders with private plants. They need the business now, they can give the subject all the study that is necessary, and will be in position to be fully informed in the future when work of this kind is necessary. As a rule orders

More Indorsements by District Ordnance Chiefs

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K H CONDIT
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THE PROPOSAL TO PERMIT THE PLACING EDUCATIONAL ORDERS BY THE WAR DEPARTMENT HAS MY HEARTY SUPPORT
COLONEL CHARLES HENNEY
CHIEF BOSTON ORDNANCE DISTRICT
335 PM

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K H CONDIT, PUBLISHING DIRECTOR
AMERICAN MACHINIST
EDUCATIONAL ORDERS TO MANUFACTURERS OF WAR MATERIAL AT ANY TIME ARE OF GREAT IMPORTANCE TO THE WAR DEPARTMENTS PLANS FOR INDUSTRIAL PREPAREDNESS AND AT THIS TIME WOULD DO MUCH TO RELIEVE UNEMPLOYMENT ASSISTANT SECRETARY PAYNES PLAN SHOULD HAVE THE STRONGEST SUPPORT OF CONGRESS AND ALL BUSINESS MEN
RALPH M DRAVO
CHIEF PITTSBURGH ORDNANCE DISTRICT
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AM DELIGHTED ENDORSE EDUCATION ORDERS AS UNEMPLOYMENT RELIEF
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of this kind come in to different plants when they are busy on commercial work and interferes to a great extent with their general line of business. We hope you will be successful in this business.

THE LODGE & SHIPLEY MACHINE TOOL CO.,
J. WALLACE CARREL, Vice-Pres.& Gen. Mgr.

High Bridge, N. J.

This company has been a supplier of materials to our government in each and every war in which we have participated. We recognize, fully, the value of educational orders as proposed by the outlined legislation.

The entire program would, beyond the importance of education, be a substantial aid toward unemployment relief, and we gladly add our endorsement.

TAYLOR-WHARTON IRON AND STEEL COMPANY,
G. R. HANKS, President.

Brooklyn, N. Y.

I wish to compliment you for bringing before the machinery industry, through the columns of the *American Machinist*, the subject of "Educational Orders," particularly at this time as a factor in unemployment relief.

The educational order, if permitted by Congress at this time would certainly relieve the unemployment situation considerably, and at the same time permit the effective execution of the provisions of the National Defense Act in so far as procurement planning in time of peace is concerned. It is the only possible instrument for effective industrial preparedness, and thereby becomes an effective instrument of peace, for the more fully the nation is prepared industrially, the less chance there is for an attack against our country by foreign powers.

The real power of industrial preparedness, which is the prerequisite for national defense, lies in the ability of industry to quickly change over from peace time to war time manufacture.

There seems to be some question as to what material gain will be obtained for the money expended on educational orders. In the first place, tooling up for production of munitions like tooling up for any manufacture is difficult, and is the factor which governs the time for start of quantity production. Through an educational order, at least one set of production tools, fixtures, working gages, etc., required for some particular component will be made available. The design of such tools will have been made, and thus the reproduction of additional sets in time of major emergency will be considerably speeded up. If this could be accomplished for each piece of material required in a major emergency, which is not produced on a production basis during peace time, our industrial preparedness would be an accomplished fact.

QUANTIPRODUCTS MACHINE CORP.,
CARL A. BERGMANN, President.

Newark, N. J.

We are very strongly in favor of having the necessary law passed authorizing the Assistant Secretary of War to place educational munition orders in private plants, and having enough money appropriated to make these orders of reasonable size.

We who are close to the machine tool and metal working industry will never forget the terrible delay in building munitions and all war materials in the last war, due to the unfamiliarity of the manufacturers and the War Department of each other's method or language.

We believe the work the *American Machinist* did before the United States participated in the last war was not appreciated by the United States Government, but we believe the data compiled at that time should be a working basis to be used in such times as the present to send out educational orders for material needed by the War Department in time of trouble.

NEWARK GEAR CUTTING MACHINE COMPANY,
U. SETH EBERHARDT, Works Manager.

Augusta, Ga.

In reply to yours of the 24th inst. If private industry is to be used by our government in case of emergency for the manufacture of munitions, we think that it would be of invaluable benefit both to the government and industry to have the experience during peace times of the manufacture of munitions, thereby gaining intimate knowledge of such work, saving considerable time for information to be gathered in the case of emergency.

A copy of this letter will be mailed to our Representatives in Congress, so they may have the benefit of our views on this subject.

LOMBARD IRON WORKS & SUPPLY COMPANY,
J. G. BELDING, President.

Rockford, Ill.

Your letter of November 25th did not reach us until the afternoon mail today. I am answering immediately, via air, in an effort to have our letter in your possession Monday, December 1.

I have twice read the article in the *American Machinist* of November 20th, by Hon. Frederick H. Payne, Assistant Secretary of War. We are heartily in accord with any measure that may bring some relief to the unemployment situation among toolmakers and mechanics.

We believe that the educational orders will help in this direction, and we also believe that if such orders were placed with commercial concerns instead of with the arsenals, it would give our manufacturing machine shops the required training to prepare them for any national emergency.

We, the Barnes Drill Co., would be very glad to render whatever service we can in this regard, and would take on such educational orders as could be handled with our present shop equipment.

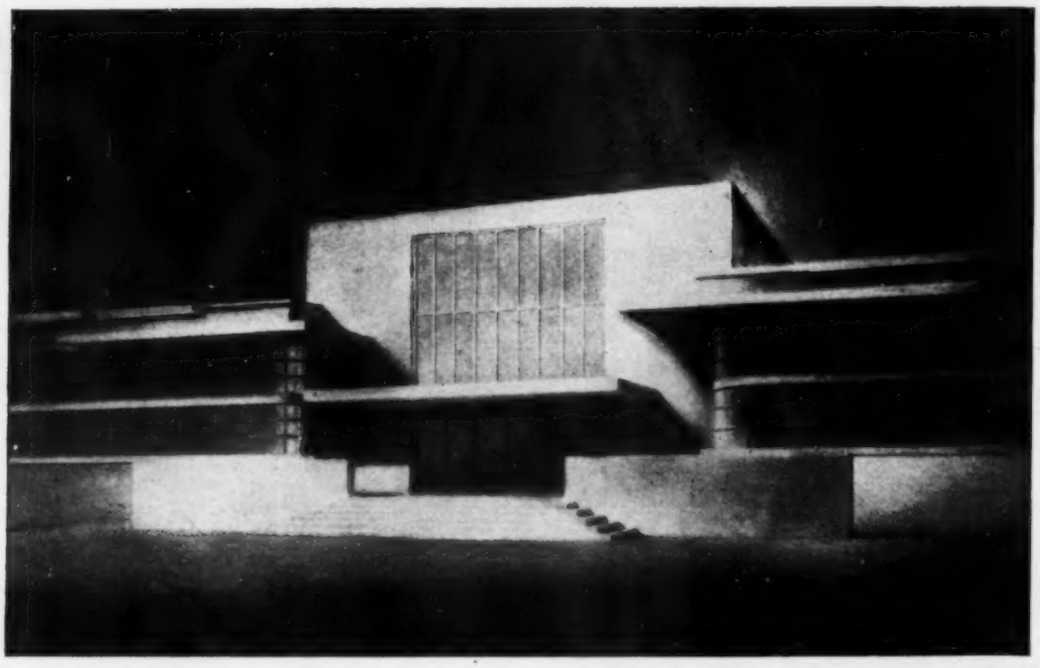
We shall be pleased to take up the matter with our Representatives in Congress at the proper time. Please keep us informed of developments.

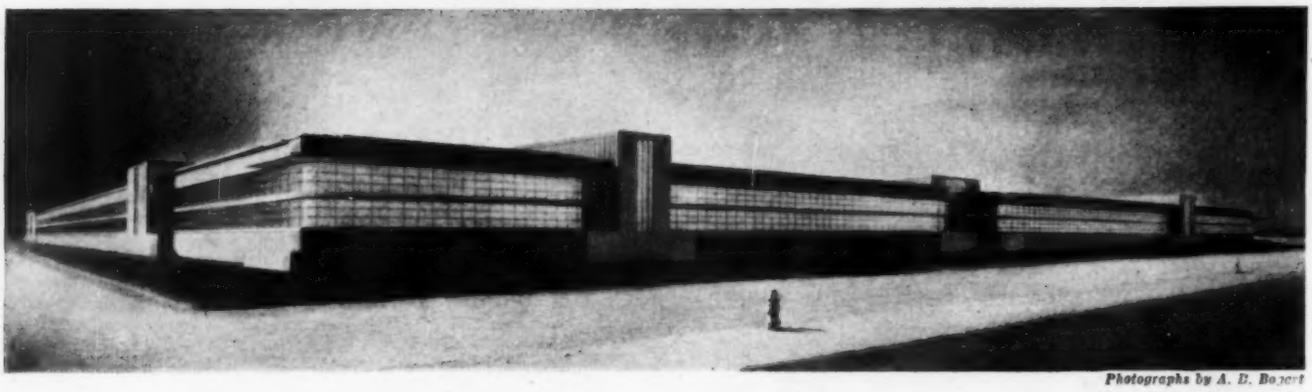
BARNES DRILL CO.,
J. E. ANDRESS, President.

Saint Louis, Mo.

We endorse and encourage immediate program tending toward the distribution of educational munition orders to private plants. Not only will this action tend toward necessary industrial defense program, but it will at this time tend to relieve the serious unemployment problem facing us all. Your efforts toward that end should be profoundly commended.

ST. LOUIS CAR COMPANY,
EDWIN B. MEISSNER, President.





Photographs by A. E. Bojert

ALL WINDOWS

Simple geometric shapes, walls almost entirely of glass, give maximum sunlight to workers. The Toledo Scale Plant is in striking contrast to the Simonds plant shown last week

COMMISSIONED to redesign Toledo scales, Norman Bel Geddes, artist in many fields, learned that scales need no complicated external moving parts, levers, appendages, awkward contours. In the process of redesign, even Mr. Geddes was surprised to learn that in producing a simpler, more decorative exterior, refinements and improvements in the inner mechanism could be introduced. The resulting series of scales so impressed H. D. Bennett, president, Toledo Scale Company, that Mr. Geddes was commissioned to create an entirely new plant.

On an 80-acre site, Mr. Geddes has placed a porcelain factory, scale factory, machine shop, central heating plant, administration building, laboratory, flying field, swimming pool, children's playground with pool, wooded picnic plot, athletic field, and groups of hangars, garages, and tennis courts. Yet the group is more imposing than any public buildings of the City of Toledo, Ohio. The radically new layout of the entire site, and the mode of construction—row upon row of windows—set it apart even from the Simonds plant described last week.

Designed to accommodate high-production machinery, the buildings are great geometrical forms with walls almost entirely of glass. Prevailing lines are horizontal. Each building is planned, not only with regard to its specific function, but with regard for inconceivable future developments. Columns and barriers have been minimized to permit future rearrangement and relocation of equipment. Machines, laid out for straight-line production, are unit driven and may be rearranged without inconvenience or delay, a problem which is still further simplified by a service basement under the entire working area. In addition to all these advantages, the plant —now under construction—is expected to be more economical to construct than its ugly, unprepossessing, and far less efficient predecessors.

Limitations of Cadmium and Zinc Coatings

Discussion

L. K. WRIGHT
Consulting Engineer

AS THE article by K. A. Eckhardt in Vol. 73, p. 429 indicates, considerable controversy exists as to the relative corrosion-inhibiting properties of cadmium and zinc.

Because of comparative scarcity, the price of cadmium has varied from 70c. to $1.20 per pound; while that of zinc has varied from 4c. to 11c. Cadmium is somewhat denser than zinc, but disregarding this fact and assuming the covering power to be equal, zinc is by far the cheaper, thickness for thickness.

U. S. Army specifications for aircraft accessories allow cadmium to be substituted for zinc platings provided the cadmium has a thickness of 0.0003 in. or more. Zinc coatings for the same service are required to have a minimum thickness of 0.001 in. or 0.6 oz. per sq.ft. On this basis cadmium required only about one-fourth the thickness needed by zinc to render steel or iron rust proof. Even under these conditions cadmium plating costs much more than zinc, but where weight is an essential factor, as in aircraft structures, cadmium is used, despite higher cost.

With present metal prices, the cost, for metal only, of electroplating 1,000 sq.ft. of surface with 0.001 in. of zinc, or the superior zinc-mercury, is about 4c., while a like thickness of cadmium costs about 44c. The weight of zinc in oz. per sq.ft. is about 0.59, and of cadmium about 0.72. If we assume a 90 per cent currency efficiency and use 30 amp. per sq.ft. current density, we find that zinc, depositing at the rate of 0.0431 oz. per amp.hr. gives the required coating in 30 min., at a cost of about 4½c. for current, where power is available at 5c. per kw.-hr. Cadmium, under identical conditions, and assuming a deposit of 0.0733 oz. per amp.hr. gives the required coating in 22 min. Faster plating makes it possible to load tanks more frequently, and reduces production costs.

It is a grave mistake to attempt to lower costs by thinning the protective coating to save metal and current, and to increase production, yet this is common practice.

In designing parts the required section is determined and then a reasonable safety factor is employed. But with platings no safety factors are allowed. The coatings are expected to be 100 per cent efficient at all times, even under adverse conditions. General practice is to whittle down the thickness and still expect perfect service. Films of metal a few ten-thousandths of an inch in thickness are certainly delicate enough to warrant the addition of a safety factor, or some other allowance which takes into account the shape or form of the particular object to be plated. All metals and electrolytes have different "throwing" powers, and sometimes the outer surfaces of a cathode may be heavily coated while the lower portions, in depression or hollows, may be "light" or not even coated at all. Probably 95 per cent of all articles that require plating are of rather intricate design, yet for the most part, they are treated as though they were flat plates.

The U.S. Bureau of Standards Circular No. 80, (1922) quoted by Mr. Eckhardt and reporting upon salt spray apparatus using a 20 per cent sodium chloride solution for testing coatings, states that such tests are comparative only. For other atmospheres and conditions other and distinctly different results may be obtained. No definite prediction can be made as to resistivity under different conditions. It was found that zinc-coated samples, placed in the spray chamber in a vertical position corroded more rapidly than identically treated specimens which were placed in inclined or horizontal positions. Zinc is not removed by the saline liquid so rapidly when not exposed directly to its spray or mist. Therefore, where opportunity for liquid to collect was presented, better resistivity was noted. Where utmost resistivity is desired, and expense is a secondary factor, cadmium cannot be excelled, as Table I indicates. To

TABLE I

Coating	Thickness	Hr. Salt Spray
Zinc, electrolytic	0.00045	316
Zinc, sherardized	0.0009	367
Zinc, hot dip	0.002	650
Cadmium, electrolytic	0.0001	150
Cadmium, electrolytic	0.0002	500
Cadmium, electrolytic	0.0003	750
Cadmium, electrolytic	0.0004	1,000
Cadmium, electrolytic	0.0005	1,500
Cadmium, electrolytic	0.001	3,000

electrodeposit metal evenly on intricately formed parts is difficult. Because of shielding of the inside surfaces, and deep recesses, certain areas are likely to be "light" or entirely devoid of coating. If the current be raised to "throw" onto the neglected surfaces, portions of the plate nearest the anodes may be burned.

For intricate formed or stamped parts, especially those with folded and bent sections, one solution is to plate the flat sheet before forming and then to replate when finished to shape. With intricate castings the hot dip method is used to advantage. This method puts on a thick coat of metal, possibly too thick on the exterior surfaces, but crevices and inner sections, the most vulnerable areas, are coated and sealed. Where parts are threaded it is a mistake to attempt the hot dip method, for recutting invariably uncovers the base metal and defeats the purpose of the coating.

Where utmost service is required of electrodeposited

rust-proof coats, it is best to "flash" a coat of cadmium on the base, for cadmium enters the finest pores and interstices and protects the base. Threads are covered right down to the root. Then a heavy coat of zinc may be applied for a wearing coat. Coatings of other metals may afford a finer appearance but they react and defeat the protective properties desired.

In one specific case a coating of zinc applied to a steel specimen by a three-minute immersion, using a standard sulphate bath, with a current density of 13.25 amp. per sq.dm., which resulted in a plate 0.00043 in. thick, was subjected to normal atmosphere exposure for ten months without showing the least indication of rusting. A similar specimen, coated with the same thickness of metal under identical conditions and treatment, was provided with a coating of pure copper as a wearing coat, 0.00107 in. thick. This specimen showed signs of rust in fifteen days, and in two months was very badly corroded, as a result of electrochemical reaction.

In testing work, salt spray enters tiny interstices and pores in the protecting skin, and the products of reaction are carried or floated away. Specimens usually are brushed with a moderately stiff brush every 24 hours, and this also serves to remove sections of the corroded coating. Thus, a very quick action is noted in the penetration of coatings that are not thoroughly homogeneous. Coatings laid on electrochemically are finely deposited and without pores, gas pits or fissures; whereas parts dipped into molten baths or sprayed with fluid metal, usually have gas and oxide inclusions. The dirt and grime met with in ordinary atmospheric exposures enter these pores and seal them. The oxide inclusions and formations are not washed or brushed away and are highly resistant to further corrosion.

Thus, even a very thin electrodeposit may survive a salt spray test, while a relatively thick coating, applied through the high temperature methods, may not. When tested in actual use the reverse may be found to apply, for the electrodeposited coating will not withstand the normal wear and tear incident to everyday existence, and breaks down more quickly than the thicker spray or dip.

Each article requiring protection against rusting should form an individual study. Some are best dipped, others electroplated. If a manufacturer desires to rush his products through either blandly and blindly ignorant, or else cognizant that, in doing so, he saves in production costs but lowers the standard of quality, the product is not likely to stand the test of time and usage.

Many laboratories are exploring the corrosion field, some working with intermittent and continuous sprays, others using alternate wetting and drying processes, and still others experimenting with reactions incident to simulated atmospheric conditions. Many quick tests have been worked out to determine porosity and thickness, but until much correlated data have been gathered and understood, the salt spray test will be used as a pilot for determining the rust proofing qualities of a plate. Eventually the salt spray test will be discarded.

Each problem should be individually analyzed and data correlated and followed so that proper results are obtained in a field test rather than in a mere laboratory determination. Take the laboratory to the field if the field cannot be placed under a bell jar in the laboratory. Determine whether zinc or cadmium is the more desirable, and see that the process of applying either one is kept up to a high standard. Then the result will be satisfactory aging in the field.

NEW BOOKS

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STRENGTH OF MATERIALS, Parts I and II—*By S. Timoshenko, professor of engineering mechanics of the University of Michigan. Cloth board covers. Illustrated. Indexed. Part I, 368 pages; Part II, 333 pages. Published by D. Van Nostrand Company, Inc., 250 Fourth Avenue, New York, N. Y. Price, Part I, $3.50; Part II, $4.50.*

A decided change is taking place at the present time in the attitude of designers toward the application of analytical methods in the solution of engineering problems. Design is no longer based upon empirical formulas. The importance of analytical methods combined with laboratory experiments in the solution of technical problems is becoming generally accepted. It is upon this premise that the author, an authority on mechanics, bases his two volumes.

Part I, "Elementary Theory and Problems," contains principally material usually covered in college courses in the subject. Derivations, however, have been simplified, and this has permitted the introduction of advanced problems, and also has given the reader with the usual preparation in mathematics as much assistance as possible in his study.

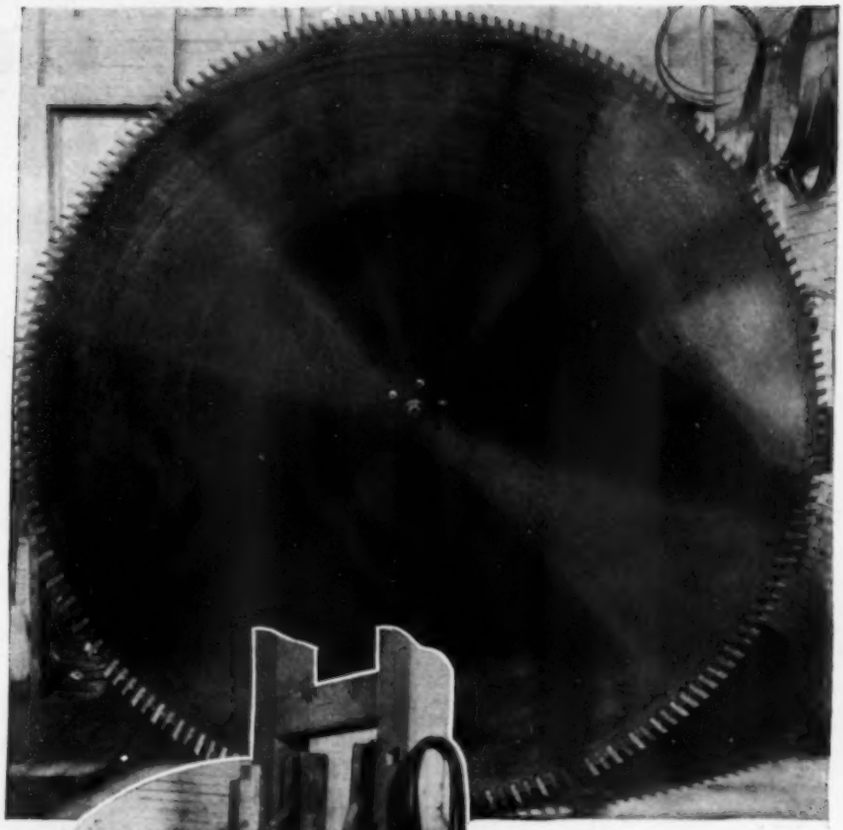
Part II, "Advanced Theory and Problems," is mainly devoted to new developments in strength of materials and the theory of elasticity. In most cases, complete derivations are given for problems of practical importance, but even for the most complicated problems where derivations are omitted, complete working formulas are provided for the solution of the problems themselves. These new methods make possible the substitution in advanced work of accurate methods of calculation for the older empirical formulas, with great reductions in material weight and cost. Practical illustrations are provided in both volumes to show the reader the connection between theory and practice and material is presented in such a fashion that the executive or engineer wishing to "brush up" on fundamentals will not consider the presentation an insult to his intelligence. The volumes will prove a worthy addition to the bookshelf of the engineer or executive with a mathematical turn of mind.

■

A BIBLIOGRAPHY ON THE CUTTING OF METALS. This is a research publication of the American Society of Mechanical Engineers under the direction of Prof. O. W. Boston, the collection of material covering a period of about ten years. References, however, of which there are 778, go gack to 1886. The arrangement of the material is most convenient. In addition to being divided by years there is a cross reference index at the back by which all information on each subject, such as cutting fluids, machinability and the various phases of the cutting process can readily be found. The booklet is published by The American Society of Mechanical Engineers, 29 West 39th St., New York, N. Y. Price $1.

SAW DENTISTRY

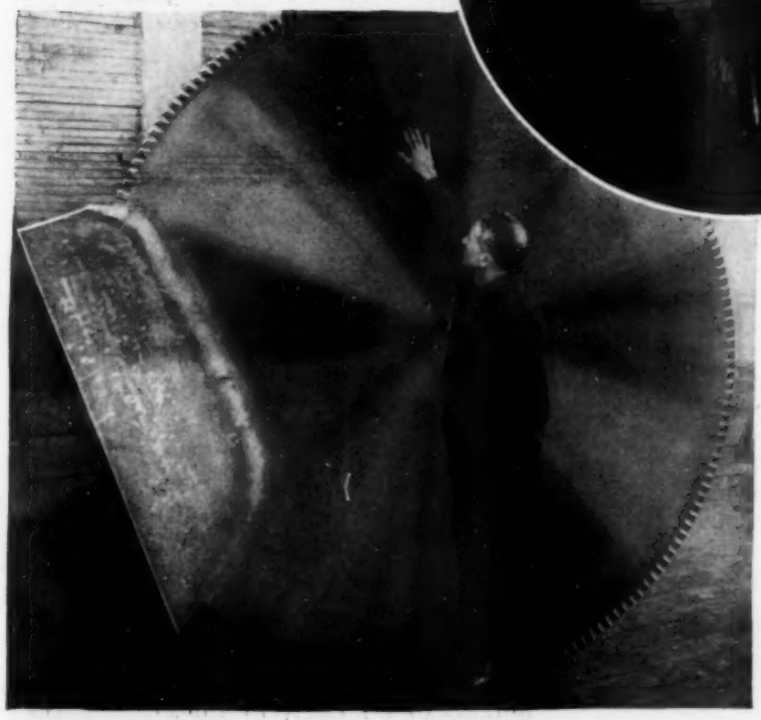
Welding, employed originally as a repair process, is still finding increasing use for its original talents. Here is pictured one job being done by a Northwestern company which specializes in saw repair



108-in. inserted-tooth circular saw repaired by welding

Progress photograph, showing the clamping arrangement used to prevent warping of the saw

The new section welded into a broken saw, before tooth sockets were cut



THE Vance Scales Saw Welding Company, Tacoma, Wash., is engaged exclusively in the repair of band, circular, and other large saws, and does all repair work in that territory for the Disston Company. A General Electric atomic hydrogen welding outfit is used. Large savings result from this method of repair, for the larger saws cost thousands of dollars. Repair jobs include welding in new centers, welding rim cracks, and inserting sections, as shown on this page.

EXECUTIVE FORUM

One Big Family

AS BILL HOLLAND stepped into the club car of the Eastern Express, he spied Richard Carlson, Personnel Director of Cummings Electric Company. Like most production men, Bill had certain set ideas on personnel work and its limitations. His views did not always coincide with Carlson's and more than once in the past, the two had engaged in lively arguments on the subject.

"How's everything at the plant?" asked Bill, taking a seat beside his friend.

"Things are picking up," said Carlson cheerfully. "I'm launching a pet scheme that I've had in mind for some time."

"Another of your welfare plans?" Bill asked.

"I wouldn't call it that," said Carlson. "It's simply to produce a more intimate spirit between our employees. I'm systematically developing the idea that after all the Cummings Electric Company is just one big family. Most of the drifters have been laid off, and it is an ideal time to put this feeling across in our organization."

"If feelings can be put across," said Bill. "It's not a new idea and hasn't always succeeded in the past."

"The trouble hasn't been with the idea itself. Some attempts to foster it were pretty clumsy and led to unfavorable reactions."

"To such an extent," said Bill, "that many companies that were highly enthusiastic have dropped their efforts in this direction entirely. But I suppose you'll be different."

"I'll try to avoid overdoing it," said Carlson. "I'm starting by reviving the company paper to let each man know what his fellow-workers are doing. We'll all know that Bill Jones has a new house and that Sam Smith has a new addition to the family. We'll have photographs of the house and the infant. Instead of being just a lathe hand in the next department, Smith will be a distinct personality with human interests like the rest of us."

"And you'll start a basketball team for the boys and a Cummings Club for the girls."

"How did you know that?" asked Carlson.

"They're always a part of such programs. But doesn't it occur to you that perhaps the Cummings Electric or any other large concern is really not a big family. It's primarily a business organization whose employees are there to earn a livelihood. And perhaps these employees prefer to work out their own social interests."

"They seem ready enough to co-operate with me," said Carlson. "It takes someone to get these things started, and so far the response has been gratifying."

"You'll get a certain percentage of the youngsters to fall in with your plan, but what about the older men who really form the backbone of the organization? Are they enthusiastic?"

"Older employees are naturally harder to reach," Carlson admitted. "They've made their own friends and developed outside interests. But that's no reason why I shouldn't go ahead with the plan for those who are receptive."

"You'll find," said Bill, "that plant activities are worth-while only when they are spontaneous. Routine efforts to develop social contacts fail more often than not. Besides that, where does your family spirit go when a business depression makes it necessary to reduce the force?"

■

What Do You Think About This Problem?

Many companies have sought to promote friendly relations among their employees to inspire greater loyalty and willing co-operation. Some attempts in this direction have been carried so far as to defeat their own purpose. What has been your experience with this phase of management? Should social activities be stimulated, or is it better to leave the use of a man's outside time strictly to himself?

. . . Discussion

of Executive Problems

■

Sales Per Schedule

Today's selling methods are wasteful. That is a broad statement and may call forth adverse comment. Those to whom the following does not apply are automatically excepted; but there remain far too many to whom it does apply.

Salesmen call too often. They call without previous investigation of the nature of the buyer's business, his requirements, or his standing. They cover their territory in a haphazard, illogical, and uneconomical manner. Their firms do not co-ordinate their advertising and sales promotion work with the activities of their salesmen. Salesmen are too prone to cut prices unnecessarily. They waste time discussing non-essentials, instead of talking to the point. They waste time trying to build a fictitious personal friendship instead of a business understanding.

There are too many salesmen in general; each firm has too many. Many are too lazy to give creative thought and effort toward filling their customers' requirements. They are trying to sell their products instead of trying to fill buyers' needs.

A modern conception of buyer and seller relations is of the seller as a sales engineer, and the buyer a purchasing engineer. The salesman will be of higher grade, will know his goods thoroughly, and will study his customers' requirements. The seller will have fewer customers, but they will be larger accounts, worth-while accounts, and his volume of business will be higher. This conception while limiting a salesman's calls, still leaves him room for more initiative than he is using at present to develop increased business—W. A. WALTER, *Purchasing Agent, Pneumatic Scale Corporation, Ltd.*

Speculating in Personnel

There are several ways of effecting economies through personnel. First, eliminate all waste and unessential work and make sure the staff is not overmanned. Next offer to retain everyone who is needed, but at a reduction in salary, explaining the reasons and with the understanding that it is only temporary. Generally, a reduction of ten per cent will be accepted graciously where it applies all along the line. Spotty reductions, except where salaries are out of line, are likely to be resented as unfair.

If the set-up of any organization is such that a reduction in salary isn't feasible and the release of valuable men would disrupt the organization and handicap it later on, the plan which one large company has followed during this depression would seem to be wise. Here most of the salesmen were specially trained; they knew the product technically and its application. Yet the product was rather a luxury and sales practically disappeared after the market crash. The heads of the business decided it would be much better to eliminate as many as possible of the clerical force and junior executives. They called the salesmen into the home office and turned over to them the work of the minor employees who were let out.

Another business, in a small town but with a 20-year history back of it, went a step further in drastic economies through personnel. Here the service shop contained the skilled labor, not always available in small towns. The owner dispensed with his own secretary-stenographer, his bookkeeper, his stock-keeper, and his counterman. He took over the bookkeeping and the correspondence himself. He called the service shop staff together and laid his cards on the table. He either had to let half of them go or offer them jobs inside at the much lower, inside pay. The mechanics agreed to stay. When business picks up, he has these skilled mechanics for immediate call. And the application of their mechanical knowledge to their new work is revealing some very significant merchandising facts. —W. KIRKPATRICK.

Concentration or Confabulation?

An executive usually has a certain amount of work which can be interrupted for a few minutes, whereas a foreman is responsible for the smooth working of his department and must be on hand in emergencies. If something unusual occurs, there may be any number of men standing about waiting for instructions. Suppose a motor fails or a rush order comes in at the time of the foreman's appointment. He has to lose time when he is very busy sending a message to the manager whereas a little later, when all has settled down, he may have time to spare. The old system of allowing the foremen to come in at their own convenience is best. But the executive who allows them in his office without a reasonable cause is wasting his own time as well as the foreman's.

—R. P. HALL,
Yorkshire, England.

Can Engineers Sell?

Much depends on the kind of machine being sold. In standard lines such as adding machines, typewriters, and vacuum cleaners, the same product is sold over and over again and technical knowledge in the salesman is not necessary. An engineer wastes his abilities and may prove an inferior salesman.

The position is changed, however, if special machinery is in question. Here the client requires a product which may have to be made to his individual requirements, or wants advice as to the best type of machine. Technical knowledge is indispensable. All sorts of technical questions occur, and an engineer makes the best salesman.

Not every engineer can sell. Happy that firm who can find men, technically trained, who also display some aptitude as salesmen. Such men are often recruited from the drawing office staff, and are not hard to find. Listen to a draftsman explaining to his chief an idea he wishes to incorporate in his job. Does he easily and

fluently bring out the best points of his proposal? Do you feel attracted by the idea? If these questions are answered in the affirmative, you have found the budding salesman-engineer.

I recall such a man, appointed as representative in India, who became the best salesman his firm ever had. Previously men had been appointed without technical abilities, and had lost orders because of long delays in answering technical questions. Now, such questions are answered immediately, and the firm enjoys a greatly enhanced reputation and a better filled order book.

—A. W. KNIGHT, *Ipswich, England.*

Research or Retrenchment?

The most propitious time to prepare for better business is when the plant is not pressed. The wise, foresighted management anticipates the larger problems, and during the slacker periods, the occasion is opportune for careful experimentation.

Too many plants have been unable to cope with the more intricate jobs offered, sometimes having to abandon unusually knotty work after a number of unsuccessful trials. Intelligent preparation permits the progressive shop to accept jobs that other plants would not undertake. Retrenchment is out of place, when a vaster, individual field is contemplated.

Just now better quotations are available; thus laboratory equipment may well be purchased, if the company can at all afford the outlay. Why wait until the plant is in a corner, rushed for work, when prospects and customers come with involved problems and time is at a premium? —FRANK V. FAULHABER.

Anticipation Without Realization

A change in management does not change any promise that a company may have made with its employees any more than it changes the obligations of the company to fulfill contracts with those from whom it purchases material. It is not so much a question of whether bonus, insurance, vacations, or what not is the best basis of reward, but rather whether the dealings between employer and employees are founded on sound business ethics.

It is evident that an understanding existed in the minds of the employees that they could reasonably expect a cash reward when they had served continuously for a period of ten years. When the company decided that it was best to discontinue this practice—which right is not questioned—they should have immediately informed their employees of the fact and have presented satisfactory reasons. To say the least, the action of the company was a bungling job. —JOHN MARK MAY.

Square Deal or New Deal?

The task of undertaking an executive position with a new company is a somewhat trying ordeal. In an old established plant, where the employees have grown up with the company, very often complete records and drawings of their product are lacking. They may have a large repair business, and because of insufficient records, have depended largely on the men in the shops to carry on this work. A new executive would have a very difficult task if he attempted to clean house at once. There are many difficulties that arise in manufacturing shops that are known only by those carrying the responsibility of manufacturing.

Sometimes an old employee feels he is in line for works manager himself. When another is selected his feelings are hurt, and it is very often the cause of his resignation. The wisest thing to do is to call him into your office and have a heart to heart talk with him. Show him it is the company's wishes that brought you here, and that he is not bucking you only, but also the company who gave him steady employment for so many years. Prove to him he has the wrong slant on the circumstances, and if at all possible, win him over to work with you. Call this interview in the afternoon before leaving the plant. This will give him the evening to smoke and think it over; very often, when he has this time to himself before seeing his old associates, he will change his opinion, and you have won the leader.

The situation may be such that by making an example of one or more of his loyal supporters you can bring the balance down to earth. House cleaning is better done after a thorough analysis. —H. A. GILLILAND, *Hamilton, Canada.*

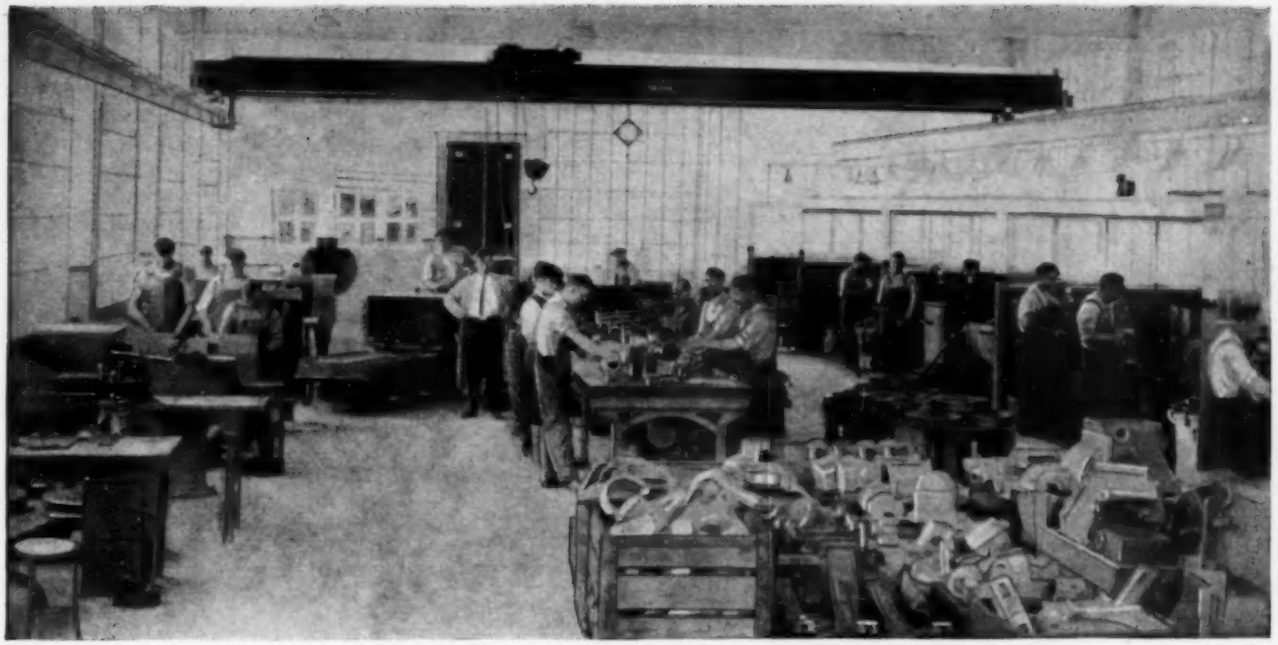
How Much Incentive?

The writer has been in charge of a manufacturing plant for 35 years, and so far has not seen a bonus system work satisfactorily for both parties. It is always difficult to set the rates to suit everyone. To avoid friction, an established rate should run at least for six months before adjustments are made. The 50-50 plan is the best. If a rate is set and the workman makes $2.00 to $3.00 over the weekly wage, some of the executives think the men are making too much money and the Efficiency Department will cut the rates immediately. This may induce the workman to further speed up. He may succeed. Then the manufacturer will cut again.

How does this affect the quality? Sometimes the best inspectors will not discover defects. The work will be inferior. If such tactics continue, all at once a wave goes through a factory and the men will only produce enough work to equal the regular weekly wages, and through such methods the beautiful bonus system for which the firm may have paid thousands of dollars goes quickly to pieces.

Efficiency engineers have been known to have the foreman fired so their mistakes may be covered up. Just recently this happened to my knowledge. This same foreman is now employed in the same capacity by a competitive firm and shows a very high efficiency and is much liked by his new employers.

I believe very little in incentive systems, as I know nine out of ten fail because of tactics such as outlined above. I am in charge of a factory employing about 175 people. I have all my foremen trained so that they get very high production out of their men, and every one of our employees knows that he has to produce. We are paying good wages and give our people a fair deal. Our factory has been in existence for about 48 years and has never had a strike. We pay by the hour and the firm is making money. No bonus system for us, as we are getting results without one. —C. H. HAWTHORNE.



General view of paint shop with glass-inclosed spray booths in the background

Putting the Finishing Touches on Machine Tools

DWIGHT VANDEVATE
Industrial Engineer, Gleason Works

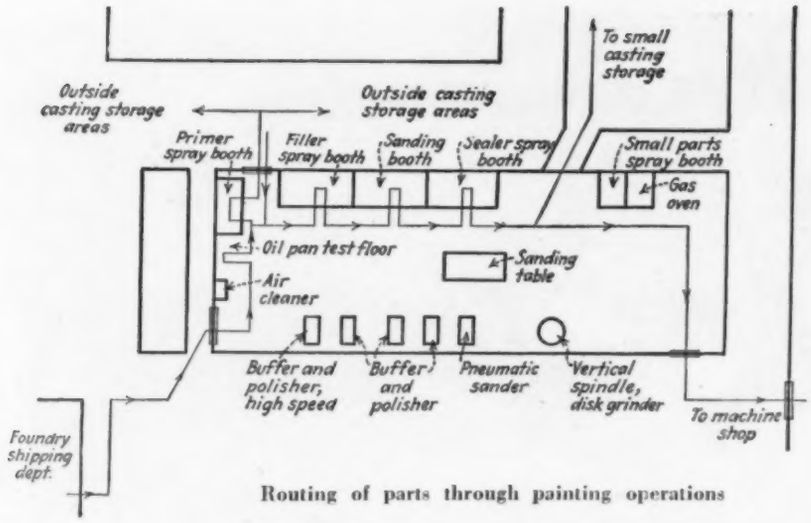
MANUFACTURE of high-grade machine tools calls for the same workmanship in painting finish as in machining finish. In building bevel-gear-cutting machinery the Gleason Works has introduced methods and equipment that give excellent results from both a quality and cost standpoint.

Among the main items adopted in efforts to secure a good, as well as an economical, finish are: the careful control of foundry practice to produce the type of casting finish desired; the centralization of painting operations in a strategic location; the use of the best painting materials and equipment; the mechanization of methods; and the adoption of straight-line production. All operations, except the final finish painting of completed machines, are centralized in a building located between the foundry shipping department and the machine shop. This building was planned, constructed, and equipped especially for this purpose.

All castings are sandblasted in the foundry before being delivered to the paint shop. This insures complete removal of loose sand before any painting is done. The operations performed in the paint shop are, in order, cleaning, priming, filling, rubbing, and sealing. With the exception of filler, all materials, including primer, sealer, putty, and lacquer are pyroxylin-base materials. Pyroxylin lacquer has been used for about three years and has proved superior to other materials for finishing machine tools. It is durable both on machines where oil is used as a cooling medium and also on grinders where the combination of soda water and abrasive subject the protective coating of the castings to a severe test.

The reason for the use of an oil-base rather than a pyroxylin filler is the extremely high cost of the latter, the added difficulty of sanding the pyroxylin material, and the fact that its use does not seem to yield any advantage. The present process includes the operation of filling on certain classes of castings only, since without it a more lasting finish can be obtained. Castings painted in this way have a tough surface coating not over 0.007 in. thick, and the chipping, which is characteristic of filled parts, is minimized. Elimination of filler on some castings was made possible through improving smoothness of the surfaces of castings produced in the Gleason foundry. Smoothness results from careful control of molding sand and even from drying molds in special ovens. Tentative plans contemplate the eventual complete elimination of filling.

In the paint shop the first operation is the cleaning and rubbing of casting exteriors to remove all minor surface irregularities. This is done mainly by mechanical means, using portable reciprocating or rotary sanders or stationary equipment for the smaller castings. Hand



Routing of parts through painting operations

sanding is done only on very irregular shapes or corners inaccessible to the mechanical devices. Castings which are to be filled are not cleaned until after the filler has been applied.

After rubbing, castings are sprayed with red pyroxylin primer on all surfaces, interior and exterior, and are allowed to dry approximately one hour. Large castings not immediately needed are stored in the yard.

In the next operation an oil-base filler is applied by spraying. The parts are then sanded down to the iron, only pores and depressions retaining the filler. After sanding (or after priming, for castings which are not filled) the sealer coat is sprayed on and dried approximately one hour. All castings finished in this way are sent direct to the machine shop for processing or are stored indoors.

Painting methods on certain special classes of parts vary somewhat from the foregoing procedure. Oil pans, for example, first are primed, all top openings being covered with metal guards. Pans then are filled with water and tested for leakage, dried, and the interiors given one coat of oil-base primer, applied by spraying. The reason for first spraying exteriors only is to make possible the use of pyroxylin primer without the delay which would occur if pans first were tested with water. Pyroxylin primer cannot be used successfully where the casting surfaces are not absolutely dry. Oil-base primer is not so affected by water, and for that reason is used for oil pan interiors.

Gages first are cleaned with high-test gasoline (ordinary grades cannot be used because of the traces of oil they contain); are rubbed and sanded to smooth the surfaces, holes, and depressions; are puttied; and a coat of flat lacquer applied by spraying. This coat requires about twenty minutes drying time. The parts then are sprayed with black crystalline lacquer and are placed in a gas oven heated to about 108 deg. F., for about a half hour, at which time the crystals form. The process involves converting all of the oxygen in the oven to carbon dioxide at which point crystal formation begins.

Finish-painting of the machine is done in a spray booth located in the main assembly bay adjacent to the inspection department. The surfaces of the main castings, which are to be covered by electrical control boxes or brackets likely to be removed from the machine at any time are lacquered when the floor assembly operation is done. Before the finish-lacquering, all bruises or scratches are filled with gray pyroxylin putty and all surfaces are washed with high-test gasoline to remove every trace of oil, for the complete removal of oil is essential to the success of a pyroxylin lacquer finish. Guards are placed over nearly all machined surfaces to protect them during the spraying, but where guards are not practicable a heavy grease is used. One or two coats of lacquer then are sprayed on and allowed to dry about an hour and a half. The guards then are removed, greased surfaces cleaned, and the machine delivered to the inspection department.

A special building was constructed for painting because the management desired to promote the health and efficiency of the workers by obtaining the best possible conditions of hygiene and working comfort through modern air conditioning equipment. Reduction of handling costs, and increased efficiency of supervision through the centralization of all painting activities also was desired. A simple system of cost control is in use. From a study of painting production the tonnage handled per man has been established. Consequently the painting force varies directly with the tonnage delivered by the foundry.

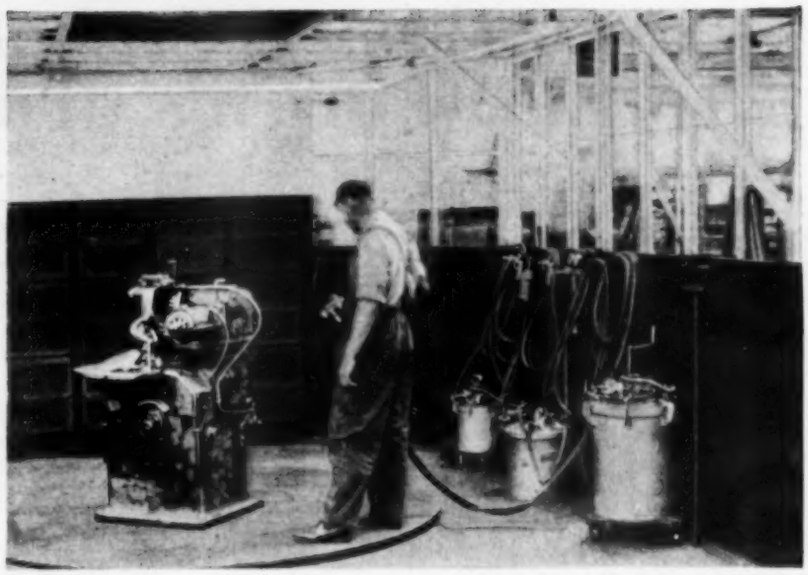
Finishing is done in a single-story building 40 ft. by 112 ft. by 15 ft. in height, with a reinforced gypsum roof. The span is clear, with no interior columns. There is glass on all four sides above the 3-ft. 6-in. curtain wall, thus utilizing all natural light possible. The service basement has a cement floor, is 7 ft. 7 in. high and contains all fans, air ducts, piping, air inlets, electrical control apparatus, and heating units. First-floor

Portable mechanical sanding equipment is used to advantage in surfacing large castings

windows are, therefore, entirely unobstructed, and ceiling and walls are noticeable for their freedom from piping. The building is provided with a three-ton traveling A.C. crane, equipped with an oil switch and operating on roller bearings.

Two air inlets, one at each end of the building, supply fresh air to the heating system. The air is drawn over steam coils and is carried through ducts located at openings at several points on the main floor. Intake air is cleaned by filters when necessary.

Air from spray booths, sanding tables, and machinery is exhausted by a downdraft system into the basement. Exhaust from the booths is discharged into the air through five stacks outside the building and terminating about 15 ft. above the roof, thus insuring complete disposal of noxious fumes. These stacks follow the wall columns outside, and consequently do not shut off any light. Air exhausted from the sanding tables and machinery is recirculated after passing through a multi-panel self-cleaning air cleaner, the louvres of which are covered with a heavy viscous liquid to effect the complete removal of all abrasive and dust.



Spray booth for final lacquering

Spraying and sanding booths are constructed of steel and clear reinforced glass, with sheet-iron siding to a height of four and one-half feet. To insure ample artificial light, when needed, the installation provides 13.07 watts per square foot on booth areas. These lights are hung from brackets over the booths. All booths have iron gratings on the floors. These can be removed readily for cleaning. Air filters cover the back of the booth to a height of 4½ ft. There are 18 filters in each booth, 21 in. by 21 in. by 4 in. deep. The frames are steel with three sets of louvres ahead of the steel-wool packing. Louvres are set at opposing angles to deflect the air flow, thus removing heavy particles. The steel wool is packed mechanically to insure an even flow of air through the filter. Filters are cleaned by washing with a hot alkaline solution in a conveyor-type washing machine. The frequency of cleaning depends upon the nature and amount of work being done. The air in each booth is completely exhausted every 4.4 seconds, with an air velocity of 240 ft. per minute at the filters and 95 ft. per minute at the face of the booth.

The booth for finish-spraying, located in the assembly building, has been in use for several years and was a radical departure from conventional spray booth design. It served as a model for the booths in the new paint building.

Electrical equipment in the paint shop was planned with a view to maximum safety and efficiency. All switchboards and starting boxes are located in the service basement with push-button controls and pilot lights on the main floor. Switchboards are of the safety type using safety fuse holders.

In the center of the paint shop is the table used for sanding small castings of irregular shape, which cannot be handled in the machines. This table has inset gratings with which exhaust ducts are connected.

Stationary equipment for cleaning, sanding, rubbing, buffing, and polishing includes a two-wheel pneumatic sander, several two-wheel grinders for sanding and polishing, and a high-speed two-wheel gooseneck machine for buffing and polishing hand-wheels and similar parts. A vertical-spindle grinder with a 30-in. diameter flat table is used for grinding covers and other flat pieces.

All furnishings in the paint shop, including lift-truck platforms, work racks, and the like, eventually will be made of steel. Such wood equipment as is now in use soon will be replaced. All painting materials are stored in a sprinklered shed adjacent to the paint building. Elimination of storage of highly inflammable materials in the finishing building further reduces the fire hazard.

■

How Steel Bends—*Discussion*

THOMAS O. FORD

MR. DEAN'S article on this subject, which appeared in *American Machinist*, Vol. 73, page 585, was very clear and helpful. However, I must take issue with him on one point, namely, that, "midway between the outer and inner curves is the neutral line." This may be true in some instances but will not apply for all metals and bends. Of course, the formulas given for obtaining flat dimensions hold true in any event, but the arbitrary selection of the neutral line will affect the accuracy of the result.

The solution seems to lie in determining the neutral line for the particular material used. The method described by B. Spector in his excellent article on "Blank Diameter," *American Machinist*, Vol. 73, page 389, may be used for this purpose. Mr. Spector suggests bending a sample piece of stock of the gage to be used and measuring the lengths of the flat sections and inside radius of the bend. These figures in conjunction with the initial blank length are used to fix the neutral line. A possible objection to this procedure is the difficulty of gaging accurately the radius of the bend and of determining the point where the flats end and the radius starts. Perhaps other readers can suggest alternate methods of locating the neutral line.

The Foreman's Round Table

GOING SOFT?

"S'MATTER, Ed? You remind me of Napoleon settling the fate of the nations."

"Nothing like that, Al. Besides my derby won't fit crosswise and my coat don't button that way. I was just doing a little thinking about that executive memo that came through this morning."

"Oh yes. You know it's funny about those things. Read 'em once and you can recite them from memory hours afterward. See how near right I am— 'As our share of the national movement to restrict unemployment, this company will retain all employees through the winter, providing a minimum of 32 hours of work per week. This policy will provide employment for all workmen at present on the payroll, with the exception of those who may be discharged for disciplinary reasons. Signed, Keith Maddon, President.' How's that? It's pretty white of the company to do that. Don't you think so, Ed?"

"Mebbe so, Al, but it's not warranted by past occurrences. Let me tell you a story to show what I mean. Years ago, when you were still chasing girls, I was an apprentice in a lathe shop. Machinists those days were floaters—wouldn't stay in one shop long enough to get settled. And it didn't matter what they were doing, when the wanderlust got 'em they'd just roll up their tools in their overalls, stop at the pay window, and drift on out. The only time they even thought of staying was just before the company picnic every year. The picnic was just a small affair —a river trip to an amusement park, with tickets, music, food, beer and cigars for the men, candy and ice cream for the ladies; everything free. But for three or four months before, the men would stick to their jobs like leeches. Why? Because they were getting something for nothing!"

"What are you suggesting, Ed, a company picnic in December?"

"No, you poor prune, a lay-off of men we don't need! A year or two ago, when things were booming, how many men ever cared about the job in hand when they saw something else that looked better? Not a man! But listen to 'em get red-headed now when anybody suggests a lay-off or shortened working hours. Why should the company carry all the burden? 'No work, no job' oughta be the motto!"

"But listen, Ed, you can't expect the employees to have the same attitude toward the company as the company should have toward them. Think of the difference in condition and position. Besides, look at all the men who do stick through thick and thin, working for the same company all their lives. How about them? Should they get laid off in hard times too?"

"Why not? Aren't company earnings lowered in slack times? Why shouldn't hard times be shared? Are we running a business organization or a charitable institution? When a man gets old enough to get a job, he oughta be able to look out for himself. Let 'em use their bank accounts."

"Bosh, Ed! The company usually has reserves; the man doesn't. Besides, does the company give the men a raise when profits go up? Not much! The extra cash is dished out to stockholders or goes to buy a new set of brushes for the sweepers. Why shouldn't some of that be put in reserve for the men who help to earn it? It could then be used in hard times to provide funds for keeping the full force going."

"Oh yeah! And we ought to hire a nurse for 'em too! Whatsamatter, going soft?"

"No, you old skinflint, I'm just trying to save your job for you."

Does labor really deserve consideration from management when business is slack? Should industry put aside reserves when profits are big to keep workers going when sales are slow? What would happen to the marketless products thus turned out?

▸ ▸ ▸ Discussion of Former Topics

The Fortune Teller

Mental tests are convenient tools for the study of human behavior, and the results of these tests should be helpful in the selection of the human factors in industry. It is generally agreed that mental alertness is an important asset for success in any line of endeavor. Those of a high degree of mental alertness are marked by an ability to size up a situation quickly, to see its relation to other situations and to arrive at a sound judgment as to the best solution.

During the past 20 years, practical psychologists have developed certain types of tests which measure this ability with considerable accuracy. A bulk of experimental evidence was furnished by applying mental alertness tests to nearly 2,000,000 men of the American army during the war. These tests played an important part in the scientific placement of soldiers in positions for which they were best suited.

Profiting by the Army experience, sets of mental alertness tests were devised that were especially adapted to meet industrial needs. These tests involved arithmetical reasoning, quickness of thinking, accuracy of judgment, and ability to follow specific instructions.

It should be remembered, however, that mental alertness is only one of the important qualities that make for success.

Physical conditions have much to do with determining an employee's general value to an organization. The mental alertness tests are not and could not be designed to measure such qualities. Many employees who are mentally slow have been able to become fairly proficient in single jobs because of long experience and practice. Again, it is natural that some employers would emphasize certain qualities while others would emphasize others.

Another point to be considered is that, although the army experience proved the value of mental tests, it did not establish many usable standards for given industries or trades. Thus, the individual plant standards in terms of mental alertness ratings are yet to be created. This means that research should precede all applications of mental tests within a specific organization. Moreover, the small size of some industrial units renders research rather difficult, both from the standpoint of expense and the small amount of experimental material available.

—M. F. Saxton,
Allis-Chalmers Manufacturing Company.

The Wail of the Weak

Co-operation cannot in any conceivable way be called a deterrent. Neither is co-operation an industrial charity: it has its place in modern management along with system, but to be of any value it must be co-operative in every sense.

Co-operation, to my mind, means merged activity, helping without overstepping the other fellow's authority, or without laying back and letting the other fellow do most of the work. If the engineering department's conception of co-operation is expecting the shop to rectify mistakes without their making the necessary changes in the drawings, then it is time for the chief to purchase a dictionary and look up the definition.

In my line I have worked in some of the larger machine shops, and have never known one of them to be successful that did not practice real co-operation. On the other hand, two fairly large shops that were run on the every-man-for-himself-and-the-devil-take-the-hindmost plan, have since gone out of existence.

—Charles R. Whitehouse, *Standards Engineer, Holtzer-Cabot Electric Company.*

Keep Out

A superintendent that goes into a department whose foreman is on vacation and makes a general change, either wants a new foreman or has poor judgment. If he wants a new foreman, it is weak-kneed procedure to go at it in this manner.

A foreman's job is to run his department the best he knows how along the lines that the management desires. It is also the duty of the management to let him know their policies so that he can work in harmony with them.

If it is necessary to make an investigation during a vacation to get a true result, then no action as to changes should be made until the foreman returns. He should be told what has been found and asked to make corrections and changes as required. If he objects to this, in face of obvious need, then stronger measures are in order.

Dealings of this nature should be above board as far as possible, and, to my way of thinking, it is poor business and management to change over a department during a foreman's vacation.

—L. F. Swenson, *Industrial Engineer, Perkins Machine & Gear Company.*

Who's Who in Industry

The "nut" who had the new idea about rate setting was economically in less danger of being "crazy" than industry in general has been for several centuries.

While acting as factory manager of one of the best small-tool manufacturing corporations in the U. S. I was required to establish rates for various departments. The line up was entirely toolmakers; some "all around," but the majority specialists or one-operation men.

First, we started with the "machine" shop, which built special production machines, jigs and fixtures, special tools and cutters, and repaired all equipment. Using the essentials on which any job or operation should be rated, we included: years of training necessary to learn the job, knowledge or education required, useful life of the man on the particular job, usefulness of the man when forced to move onto another job in the plant, and

the value of the job or operation compared with others.

As the "machine" shop required the best and most skilled men, this department was called the 100 per cent, or standard, by which other departments would be measured, and its rates set from 80 to 90 cents per hour. Then we passed through the automatic and engine lathe, primaries, milling, clearing, hardening and drawing, straightening, forge, grinding and finishing departments, rating each operation in cents per hour compared with the "machine" shop. Set-up men were rated near or at the 80 to 90 cent rate as they required almost all-around toolmaking experience.

That gave the first general divisions. To arrive at the worth of each individual or his percentage value in his own operation, we considered: production ability 40 per cent; versatility 30 per cent; willingness to co-operate on any job and work overtime or on either shift 15 per cent; attendance 10 per cent, and last and least in economic importance, length of service 5 per cent. For example: if a man rated 90 per cent and his division paid from 60 to 70 cents per hour he received the base rate 60 cents plus 90 per cent of the 10 cent differential, 9 cents, or a total of 69 cents per hour.

Foremen predicted irreparable losses of old and indispensable employees when the plan was about to be started as one of several management economizing and equalizing moves. The principal results on the balance sheet were reflected in an immediate improvement in quality, with lessened sales efforts, a production rise of over 50 per cent and a reduction in the weekly payroll from $14,700 to about $11,500. Many long-service "sleepers" eliminated themselves by their value rating or were let out.

It is seven years since we inaugurated that plan and that corporation still rates its men and operations without any appreciable deviations from the original idea.

—E. E. GAGNON, *Mech. Supt. & Ind. Engineer, U. S. Asbestos Div. of Raybestos-Manhattan, Inc.*

Wrong Number

The question of private telephone calls gives rise to more heated discussions than any other shop privilege. Checking up on phone conversations is out of the question, as a sense of fairplay forbids eavesdropping. Wholesale banning of private calls is the usual practice, and is not a hardship. In cases of emergency a message can always be given to the phone girl and the minor publicity which ensues is not worthy of complaint.

Officials naturally expect to be exempted from the ban, and a great deal of tact is necessary in fixing the line of demarcation between those that may, and those that may not, have phone privileges. This is the real difficulty.

—VERNON WADE, *Glasgow, Scotland.*

The Community Fund

The average worker is sufficiently generous to support any organization administering to the needs of the destitute, provided he is satisfied that the funds are justly distributed. Unfortunately, a community fund is adversely advertised in much the same manner as matrimony is advertised by the divorce courts. The unsuccessful candidate for charity who owns a house or car is always willing to broadcast the refusal, while those receiving aid are usually, and naturally, reticent.

An employer, having first satisfied himself that the funds are properly handled, should proceed to sell the scheme to his employees. If adequate contributions are not forthcoming, a definite percentage of earnings should be fixed as a minimum, and insisted upon. An unwritten law handles the situation effectively, and offends no edict of the State.

While this method appears drastic, the community fund plan is doomed to failure without it, and the wasteful multiplicity of charitable organizations will again prevail.

—GILBERT G. COOMBS.

Do Errors Cancel Each Other?

One error does not cancel another. Joe is not so favorably situated as the inspector, inasmuch as the oversight of the inspector in passing the material is corrected when the error is discovered, but Joe's mistake cannot be corrected. The fact that the inspector passed Joe's incorrect bevel gears does not release Joe from the results of his error. The inspector is, of course, culpable in passing them, but it was Joe who made them.

Nevertheless, I believe the proposition to deduct from Joe is open to question. Much depends upon what record he has had in the past. If he has had a long record as a careful, conscientious and capable workman would it not be harsh to charge him up with the wasted time? On the other hand, if his past record is not very favorable it would seem to indicate habitual carelessness.

—H. GREENHALF, *Walkerville, Canada.*

Under Cover

In extreme cases, where it is known that stealing is going on, it may be necessary to place informers in a shop; but as a general rule they should be avoided. A man who takes a position as an informer cannot be trusted to give correct information, and if attention is paid to all his reports, some good men may be discharged because he has a personal grudge against them.

—J. WALTER WRIGHT, *Assistant General Foreman, Wilmot Fleming Iron & Steel Company.*

The Worm Turns

A foreman was once complaining to me that the management was spending five thousand dollars on a certain recreational project. He believed that this money should be put into the pay envelopes. He was not convinced when I showed him that, with three thousand employees, his share for the year would be less than two dollars or about three cents a week.

A clean shop and good working conditions are not properly classed as welfare work; they are necessities. A workman should recognize that it is as much the duty of the employer to furnish proper working conditions as it is to pay wages on time; and it is the duty of the employee to co-operate in maintaining shop standards. If his privileges are curtailed for the benefit of others he is usually satisfied when the reason is explained to him. —HARRISON G. BROWN, *Supervisor of Standards, Crompton & Knowles Loom Works.*

Hole Spacing with a Microscope

WILLIAM C. BETZ
Fafnir Bearing Company

OF THE many ways of laying out and boring holes in jigs, the use of the microscope seems to be the least understood. This instrument in combination with a set of size blocks can be advantageously employed to obtain center distances within a tolerance of plus or minus 0.0002 in.; the chance of error is less than for some of the better known precision methods.

When using the microscope, the plate or part to be bored is ground flat and parallel with two edges finished square with each other. The hole centers are then carefully scribed, using a set of size blocks with a scratch that may be wrung to them. The blocks and scratch are securely clamped to an accurately finished surface plate as shown in Fig. 1. This means of holding the scratch lessens the possibility of error, caused by the blocks cocking, which may occur when working at a considerable height. If a regular height gage attachment is available, it will do very nicely. The work should be clamped to an angle plate with one of its finished edges resting on the surface plate or on a pair of parallels. The scratch is brought into contact with the work very lightly because it will look like a rut under the microscope if much pressure is applied.

The microscope is held in the tool post of a lathe or boring mill, and the work fastened to the faceplate. The intersection of a pair of lines is roughly centered by

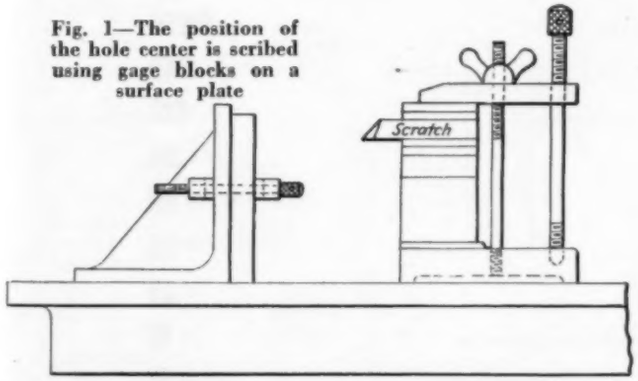


Fig. 1—The position of the hole center is scribed using gage blocks on a surface plate

using the tailstock or a surface gage. The lines on the work are brought to vertical and horizontal positions by rotating the machine spindle, and the cross hairs on the microscope are set to coincide. Then the spindle is rotated through 180 deg. and the lines on the work are again sighted through the microscope. The chances are that the relation of the cross hairs to the scribed lines will be as shown in Fig. 2. By tapping the work on the face plate, the distance between the scribed lines and the microscope hair lines may be approximately halved. This procedure is repeated until the cross hairs on the microscope coincide perfectly with the scribed lines on the work at any of the four 90 deg. positions of the spindle.

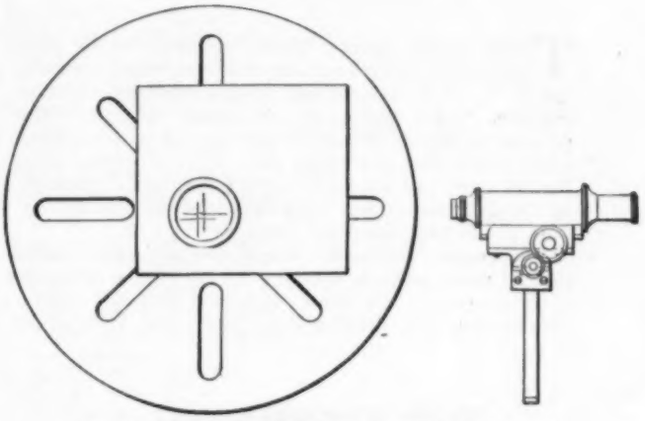


Fig. 2—The scribed lines are located on the axis of rotation by means of a microscope

Then the faceplate is balanced by counterweights, and a sight is taken on the intersection of the work lines while the spindle is revolving at boring speed. Any slight inaccuracy of the intersection is quickly detected, as an ordinary microscope will magnify from 28 to 40 times. This process insures that the work is in dynamic balance. The hole is then drilled and bored to size and the procedure repeated for the other holes.

■

Why a Gas-Engine-Driven Tractor?
Discussion

C. M. HERMENS
McMinnville Iron Works

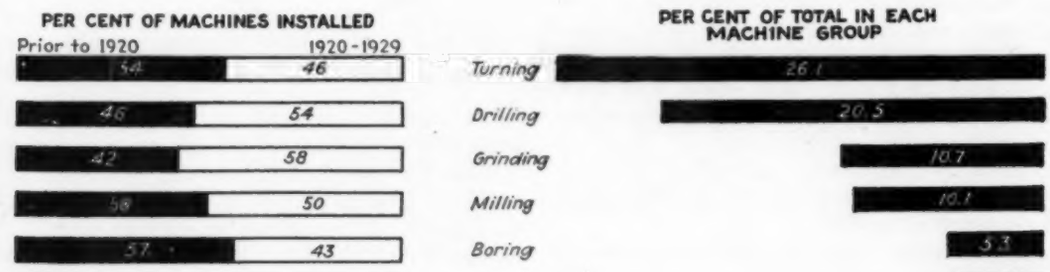
IN HIS discussion of my article under the above title on page 1023, Vol. 72, of the *American Machinist*, N. G. Morgan on page 548, Vol. 73, says steam never was successful as a source of tractive power on the farm. True! Carrying heavy, cumbersome boilers and heavy engines mounted above them, the experimental steam tractors were not fit for field work. But consider the "White Steamer" and its success as an automobile. A steam plant of that type can be put on a tractor that will give the desired results, that is, lighter weight for actual power, ease of handling, cheapness, higher efficiency and dependability, and longer life. These are not idle assertions. We have made a steam plant in our own shop and applied it to a Fordson tractor with striking success. I think there is a decided opportunity for further development in this direction.

AMERICAN MACHINIST 1930 INVENTORY
of Metal-Working Equipment

THIS group covers steam engines, (other than locomotives) turbines, internal combustion engines not made in motor vehicle plants, tractors, traction engines, water turbines, and water wheels. The present inventory shows 51 per cent of equipment in place more than ten years old. This is higher than the 44 per cent average for all industries obtained in the 1925 count and 23 points higher than the engine group percentage of five years ago.

The engine and water wheel industry is a sizable user of machine tools showing 31,497 pieces of equipment in place. Of these 46.6 per cent fall within the turning and drilling divisions. The number of machines in place is only slightly larger than the 29,615 reported in 1925. However, the number of old machines has almost doubled during the 5-year period accounting for the rise in old equipment percentage. The industry apparently needs new machines to restore its former physical efficiency.

Report No. 17 — Equipment used in engine manufacture


PER CENT OF MACHINES INSTALLED
Prior to 1920
1920-1929
PER CENT OF TOTAL IN EACH MACHINE GROUP
Turning 54 46 26.1
Drilling 46 54 20.5
Grinding 42 58 10.7
Milling 50 50 10.1
Boring 57 43 5.3
Gear Cutting 20 80 4.4
Presses, Power 73 27 3.9
Cutting-Off 63 37 3.0
Presses, Hand 75 25 2.3
Shapers and Slotters 69 31 2.0
Welding 16 84 1.8
Threading 59 41 1.6
Planing 61 39 1.6
Shears 78 22 1.5
Bending and Straightening 63 37 1.1
Polishing, Lapping, and Honing 50 50 1.0
Keyseating 70 30 0.8
Centering 40 60 0.6
Broaching 42 58 0.6
Riveting 54 46 0.5
Hammers 64 36 0.5
Forging 100 % 0.1
AVERAGE 51 49

Machines in Plants Making Engines

	Total Number in Plants 1930	Number Installed Before 1920
LATHES		
Engine	3,699	2,419
Hand Turret	582	466
Power Turret	1,953	983
Automatic and Semi-Automatic	310	26
Chucking (Not Chucking Machines)	26	26
Speed and Bench	194	91
Crankshaft	155	13
Toolroom Type	323	129
Other	39	13
CHUCKING MACHINES (Not Chucking Lathes)	13	
SCREW MACHINES		
Hand	388	168
Automatic, Single Spindle	453	103
Automatic, Multiple Spindle	91	
CENTERING MACHINES	194	78
MILLING MACHINES		
Hand (No Power Feed)	298	142
Bench	26	
Plain (Knee and Column Type)	1,475	957
Universal (Knee and Column Type)	336	181
Vertical (Knee and Column Type)	272	129
Lincoln Type Manufacturing	39	13
Continuous, Rotary Table or Drum Type	26	
Planer Type	647	129
Other	65	
GEAR CUTTING MACHINES		
Rotary or Milling Type	181	52
Hobbing	737	209
Planing or Shaping	440	52
Other	26	
BORING MACHINES		
Horizontal Boring, Drilling and Milling	841	440
Vertical Boring Mills	724	492
Other	91	26
JIG BORERS	13	
DRILLING MACHINES		
Radial	1,449	828
Upright, One Spindle	2,742	1,294
Upright, Two or More Spindles	711	233
Upright Gang (Two or More Heads)	103	52
Sensitive, One Spindle	711	246
Sensitive, Two or More Spindles	414	285
Sensitive Gang (Two or More Heads)		
Two, Three and Four Way	168	
Other	168	65
THREADING MACHINES		
Single Spindle Tapping	168	116
Multiple Spindle Tapping	13	
Pipe Threading and Cutting	142	91
Bolt Threading and Cutting	142	91
Thread Chasing	13	
Thread Hobbing and Milling	26	
Thread Rolling		
Other	13	13
PLANERS		
Open Side	26	13
Double-Housing	466	285
SHAPERS		
Vertical	13	
Horizontal	556	375
Slotters	52	52
KEYSEATING MACHINES	259	181
BROACHING MACHINES	181	78
GRINDING MACHINES		
Plain Cylindrical	479	207
Universal Cylindrical	103	52
Surface, Reciprocating	91	26
Surface, Rotating	129	78
Internal	298	78
Crankshaft	78	
Cutter	621	233
Floor, No Feed Attachments	841	504
Bench, No Feed Attachments	116	39
Abrasive Disk	220	78
Abrasive Belt	13	
Centerless	39	13
Other	362	129
POLISHING AND BUFFING MACHINES (Including those in Plating and other Depts.)		
Abrasive Wheel, Hand Operated	246	142
Abrasive Belt, Hand Operated		
Automatic and Semi-Automatic		
LAPPING MACHINES	13	
HONING MACHINES	52	13
CUTTING-OFF MACHINES		
Parting Tool Type		
Power Hack Saw	647	421
Rotary Cold Saw	155	91
Bandsaw	91	52
Other	39	39
WIRE FORMING MACHINERY		
Spring Coiling		
Other		
WELDING AND CUTTING MACHINES		
Resistance Welding, Butt	13	13
Resistance Welding, Spot	78	52
Resistance Welding, Seam	13	
Resistance Welding, Other		
Arc Welding	194	
Electric Cutting		
Gas Welding	207	26
Gas Cutting	65	
RIVETING MACHINES, STATIONARY		
Pneumatic	26	
Hydraulic	13	13
Power	129	78
PRESSES		
Punching Machines		
Combined Punches and Shears	78	26
Hand, Arbor	504	362
Hand, Light Punch Press Work	233	194
Foot, Light Punch Press Work		
Power, Crank Type	129	91
Power, Toggle Type		
Power, Double Acting		
Power, Dieing Type	686	556
Power, Trimming Presses		
Power, Forcing, Arbor, Wheel	26	13
Hydraulic, Bending, Forming, Drawing	116	78
Hydraulic, Wheel Forcing, etc	155	91
Baling, Power and Hydraulic		
Other	26	13
BENDING AND STRAIGHTENING MACHINES		
Bending Brakes	129	91
Bending Rolls, Horizontal	168	103
Bending Rolls, Vertical		
Straightening Rolls	26	26
Other	26	
SHEARS		
Knife	349	285
Rotary, Slitting	116	78
NIBBLING MACHINES		
HAMMERS		
Drop	13	13
Helve		
Spring	52	26
Steam	52	52
Pneumatic (not portable)	13	
Other	13	
FORGING MACHINES		
Bulldozers	26	
Hot Forging Machines		
Cold Headers, Bolt, Nut, etc.		
Cold, Swaging		
Forging and Flanging Presses, Hydraulic		
Other Forging Machines		
Total	31,500	16,110

IDEAS FROM PRACTICAL MEN

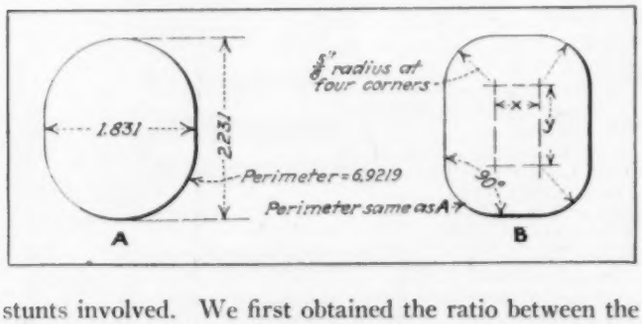
Transformer Tube Tooling

C. W. HINMAN
Chief Tool Designer, Kobzy Tool Company

WE HAD a templet furnished us representing the sectional area of an arbor, several feet in length, that had been used for winding insulating material in the manufacture of transformer tubes. This templet with all the known dimensions is shown at *A*. The problem involved was to make an arbor with a sectional area meeting the following conditions:

The new perimeter must be the same as the old, namely, 6.9219 in.; the new sides and ends must be square with $\frac{5}{8}$-in. radii at the four corners. At the same time, the new width and length of the desired templet must be directly proportional to the width and length of the old templet. The new templet is represented at *B*.

We soon learned that, while this appeared very easy at first glance, there were some very nice mathematical



stunts involved. We first obtained the ratio between the length and width of the old templet at *A*, by dividing 2.231 in by 1.831 in., obtaining a quotient of 1.2185. From the tables given in American Machinists' Handbook, we found the circumference of a circle having a diameter of 1.250 in. to be 3.927 in. This circumference divided by 4 gave 0.98175 in. which is of course, the length of the arc at each of the four corners of *B*, having $\frac{5}{8}$ in.-radii. This was to be used for checking purposes later. Next the difference between 6.9219 in., the perimeter of both the old and new templets, and 3.927 in., the length of the four corner arcs, was found to be 2.9949 in. which is the length of the four straight parallel sides of *B*.

In the next step we let x equal the width of the new templet between the centers of the $\frac{5}{8}$ in.-radii and y the length between the same centers as shown at *B*. Then 1.250 in. plus x would be the total width of the new templet, and 1.250 in. plus y would be the total length. To solve for x and y, it was necessary to use the following simultaneous equations:

$$\frac{1.25 + y}{1.25 + x} = 1.2185 \text{ (the ratio required)}$$

$$2x + 2y = 2.9949 \text{ (length of sides)}$$

Transposing and collecting terms:

$$y - 1.2185\,x = 0.2731$$

$$y + x = 1.4974$$

Subtracting $2.2185\,x = 1.2243$

And $x = 0.552$

Substituting in the second equation: $y = 0.9454$

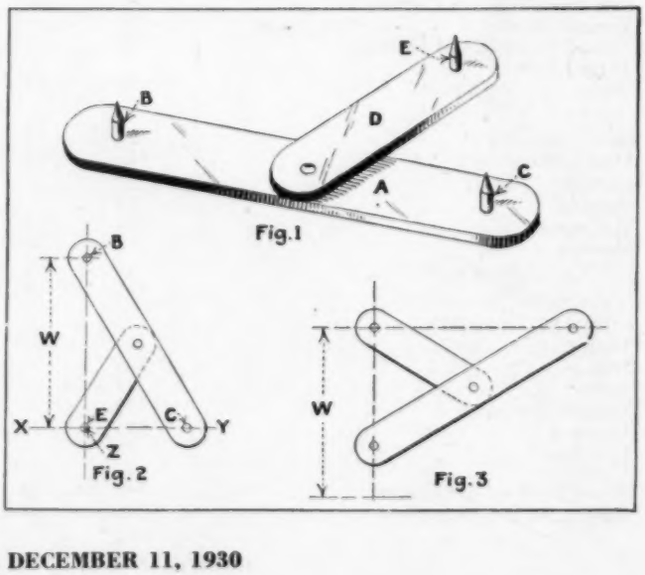
Since 1.250 plus x equals the total width, and 1.250 plus y equals the total length of the new templet we have, 1.802 in. and 2.1954 in. respectively as the desired width and length. These dimensions meet all the requirements and prove as to perimeter and ratio, close enough for all practical purposes.

Right Angle Gage

R. H. KASPER
Master Mechanic, Steel Heddle Manufacturing Company

When laying out templets, or other sheet-metal work, the use of a square for scribing perpendicular lines is somewhat slow, and the accuracy depends greatly on the eye of the worker. The use of dividers is more accurate, but is also slow. The tool shown in Fig. 1 was designed for laying out perpendiculars quickly and accurately.

The tool consists of a straight bar *A*, carrying the prick points *B* and *C*. Midway between the prick points is pivoted the bar *D*, which carries the prick point *E*. Bar *D* must be pivoted at the exact center between points *B* and *C*, and the point *E* must be located at a distance from the pivot exactly equal to one-half the distance between points *B* and *C*. Then if the bar *D* is swung on its pivot, the point *B* will describe a semi-circle between points *B* and *C*. A rule of geometry states that an angle inscribed in a semi-circle is a right angle regardless of the angular position of *D* in relation to bar *A*. Bar *D* may be fastened rigidly on bar *A*, if desired, but the advantages of having it pivoted will be



found where there are space limitations; bar *D* may then be positioned to suit requirements.

Fig. 2 shows the method of using the tool. A perpendicular is to be drawn to the line *XY*, intersecting it at *Z*. Prick point *E* is placed at *Z*, and prick point *C* is placed at any point on the line *XY*. A light blow over prick point *B* will mark the point through which the perpendicular will pass. Assuming that a line is to be scribed parallel to *XY* at a specified distance *W*, bar *D* is locked with points *B* and *E* spaced to the distance *W*. After the perpendicular is drawn, the tool is relocated as in Fig. 3.

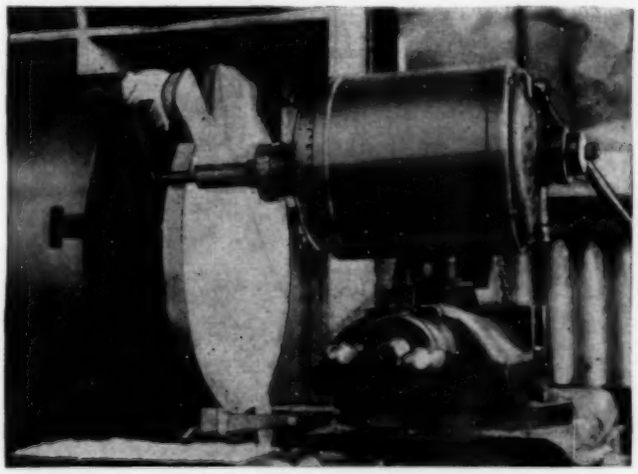
■

Milling in the Lathe

JOHN HOMEWOOD
Instructor in Engineering Drawing,
Chaffey Union High-School and Chaffey Junior College

Recently, we had to finish an aluminum casting for a pattern. While the casting was round, there were several lugs projecting from the periphery, so that turning it in the lathe was out of the question. The casting was held in the lathe chuck by a hub at the back. A toolpost grinder, in which an end mill was held, was mounted on the compound rest of the lathe, the set-up being shown in the illustration. By this means the periphery of the casting was milled.

Since the spindle of the lathe could not be revolved



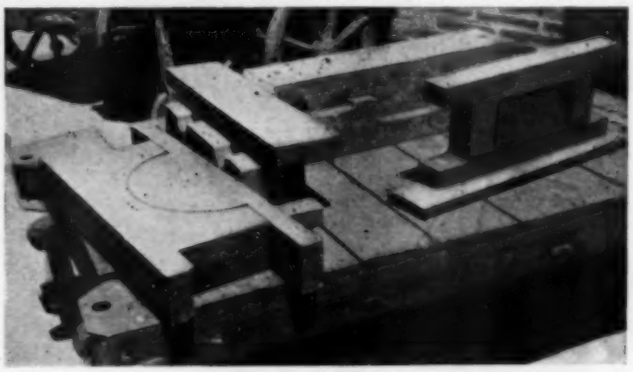
slowly enough by power, it was revolved by pulling the belt by hand. In order that too much strain would not be placed on the motor, very light cuts were taken. Owing to the speed of the motor, only soft metals, such as aluminum, could be machined by this method. As there were no projections on the face of the casting, that part was machined in the usual manner.

■

Bulldozer Dies Made Economically

H. P. LEONARD

The photograph shows some typical examples of bulldozer dies cut out of flat stock with a guided oxygen cutting torch. For the class of work done, which is on round and flat stock for freight car parts, no subsequent machining is necessary with the exception of drilling the bolt holes. Previously much of this work was roughed out and finished in the shaper, a long and costly method. Even the material cost is low as old car axles



are used, flattened out under the steam hammer and normalized before use. These bulldozer dies are in use in the forge shop of the Chicago, Rock Island & Pacific Railway Company at Silvis, Illinois.

■

Chromium for Die Plating and Salvaging

G. F. OLIVER
Factory Manager, J. W. Murray Manufacturing Company Division, The Murray Corporation of America

Today, nearly all large plants that maintain their own plating departments salvage thousands of dollars worth of tools and gages by chromium plating the wearing surfaces and regrinding again to standard sizes. A great many tool engineers also specify chromium plating on new tools and gages to prolong the life of the tools, thereby saving considerable expense in replacing and repairing. There are a thousand and one different places where chromium plating can be used to increase production, reduce expense, and improve the quality of the product.

In the manufacture of heavy stampings, such as automobile chassis frame parts, at our plant, chromium plating plays a very important role. In the forming of frame cross members, engine supports, and frame side members, for example, considerable difficulty formerly was experienced in producing a smooth surface, especially at the radii where the metal thickens, resulting in scored die walls and rough surfaces on the stampings. We tried various grades of tool steel, recommended for their glass hardness, but not until we adopted chromium plating of the die sections did our trouble cease. Prior to this we were continually stoning and grinding the die sections, in order to satisfy our rigid inspection of these parts. This delay, of course, increased our labor cost and slowed up production in proportion.

The cost of chromium plating the forming die sections of an automobile chassis side member die is negligible as compared to the original cost of the die. All that is necessary is to proceed in the usual way, building dies according to standard practice, using the customary quality of tool steel, then hardening the die sections and completing the die ready for tryout. Proper radii are then developed by grinding at the various points on the die walls to allow the metal to flow properly. Next, after

the die is ready for production, all of the die sections that are likely to score are removed and the working side is given as high a polish as possible. Care must be taken not to change the radii or the joint surfaces. Chromium plate then is applied to the sections, until a coating from 0.001 to 0.002 in. thick is built up. This gives a die that can be used in making several thousand stampings with very little attention.

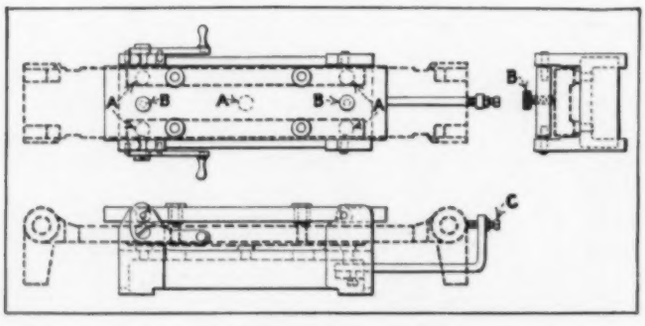
■

A Latch-Cover Jig Shorter Than the Work

FRANK HARDY

A jig shorter than the work to be drilled, and provided with a latch cover, is shown in the illustration. A finished pad on the under side of the work rests on the five pins *A*, and the work is held down by the two knurled-head screws *B*. Machined pads on the sides of the work contact with finished lugs at both ends of the jig body, thus locating the work sidewise. The work is located endwise by means of the stop screw *C*. Loading and unloading the jig is accomplished by removing the cover, which is also the bushing plate. Pins at both ends of the cover engage in slots near the ends of the jig body. The slots at the right-hand end are open toward the left, while those at the left-hand end are open at the tops. Latches engage the pins at the left-hand end and hold the cover in position.

In removing the cover, the latches are lifted, allowing the pins at the left to be lifted out of their slots. The



cover is then slid to the left until the pins at the right are disengaged from their slots. The cover is now free and can be lifted off. In replacing the cover, the operation is reversed. In operation, the work is laid in the jig with the lower pad resting on the five pins *A*, the cover is put on and the latches are hooked over the pins at the left, and the right-hand end of the work is then brought against the stop screw at the right. Tightening the knurled-head screws holds the work firmly in place. This latching feature for easy removal of the cover can be adapted to jigs for quite a variety of work, and a jig that is shorter than the work will be appreciated as a convenience where long parts are drilled.

■

Overhead-Pilot Taper Attachment for a Turret Lathe

The device described in Vol. 73, page 600, is protected by a patent held by the Warner & Swasey Company covering a pilot bar with a pilot bushing.

SEEN AND HEARD

●

Good Machines That Do Not Pay

SPEAKING of gear cutting methods recalls a recent visit to a shop that cuts sprockets for chain drives. Here, to my surprise, I found some of the Stevenson gear cutter machines that made something of a splash a few years ago. But the machine never really got on the market. There was no question of its ability to cut gears, but it was economical only for cutting oodles of the same size and kind of gears. Setting up was a man-sized job, and nothing but a very long run made it possible to use the machine economically. It was one of the many cases where the possible market was too small to make the machine profitable regardless of its merits.

Discarding the Split-Worm

ONE OF THE TENETS of worm gear design has been the use of the "split" worm to secure extreme accuracy. This split-worm construction utilizes two disks bolted together by an even number of bolts, the parting between the two disks being in the axis of the worm. After hobbing of the two-part worm wheel in the usual way, the two disks are shifted half way around and a very light cut taken with the hob. This was supposed to be the last word in securing an accurate worm.

And now comes a gear expert who makes gears instead of theorizing about them, and who says the split-worm theory hasn't a leg to stand on. What's more, he backs up his belief by building some mighty accurate machines to make big gears for heavy power transmission where noise is to be reduced to a minimum. The worm gear of course is the mainspring of the indexing mechanism, which just has to be accurate if good gears are to be had from the machine. —*J. R. G.*

Each Man His Own Tool Grinder

"THESE boys talk of production tests on machine tools!" This from my machine-shop friend of 1890. "Why, we used to test our 21-in. lathes by cutting one thread in two inches! You know, those old lathes were only made to cut from one to 32 threads an inch, and we had to compound the pick-off gears to get one thread in two inches. We figured that if the carriage would stand that, it would stand anything! And by the way—there was no figuring and wrangling over the clearance angle and such—no tables, no cutting tests with dynamometers! No sirree! The foreman ground the tool himself—and he knew just how it had to be. He didn't grind it on an emery wheel either, he ground it on a grindstone, and took as long as he damn pleased to do it—and nobody kicked. Boy, every one of those boys ground his own tools and thought he knew more about grinding them than anybody else. Why, if you mentioned grinding his tools to one of them it was murder! Ah yes, they were tacky as they come, but those boys knew their stuff!" —*T.*

Chemicals Used in Electroplating and Metal Finishing

Chemical Name	Formula	Other Names	Color	Form	Grades	STANDARD CONTAINERS Net Weight	Package
Acetic Acid	C_2H_3COOH	Vinegar Acid	Colorless	Liquid	Tech.U.S.P.,B.P.	450 lbs.	Barrels
Aluminum Sulphate	$Al_2(SO_4)_3.8H_2O$		White	Crystals	Iron Free, Tech.U.S.P.	400 lbs.	Barrels
Aqua Ammonia	NH_4OH	Ammonium Hydroxide	Colorless	Liquid	Tech.U.S.P.16°-20°-26°	100 lbs.	Carboys
Ammonium Carbonate	$(NH_4)_2\ CO_3.H_2O$		Colorless	Crystal Plates	Tech. U.S.P.,B.P.	50 lbs.	Cans
Ammonium Chloride	NH_4CL	Sal Ammoniac	White	Crystal	Technical	275 lbs.	Barrels
Ammonium Sulphate	$(NH_4)_2\ SO_4$		Grey to White	Crystals	Coml. Tech.U.S.P.	200 lbs.	Bags
Ammonium Sulphocyanide	NH_4SCN		Colorless	Crystals	Technical	1-5 lbs.	Cans
Antimony Pentasulphide	Sb_2S_5	Antimony Sulphuret	Yellow or Orange	Powder	Technical	100 lbs.	Drums
Antimony Trichloride	$SbCL_3$	Butter of Antimony	Colorless	Crystalline Mass	Technical	1 lb.	Can
Arsenic Trioxide	As_2O_3	White Arsenic	White	Powder	Tech.,U.S.P.	500 lbs.	Kegs
Barium Nitrate	$Ba\ (NO_3)_2$		White	Crystals or Powder	Technical	112 lbs.	Kegs
Barium Sulphate	$Ba\ SO_4$	Permanent White	White	Crystalline Powder	Tech.,U.S.P.	700 lbs.	Barrels
Barium Sulphide	BaS	Barium Monosulphide	Green or Grey	Powder or Lumps	Technical	1 lb.	
Boric Acid	H_3BO_3	Buracic Acid	White	Crystals	Tech., U.S.P.,B.P	300 lbs.	Barrels
Cadmium Sulphide	CdS	Cadmium Yellow	Yellow	Crystals	Technical	100 lbs.	Kegs
Calcium Carbonate	$CaCO_3$	Whiting	White	Crystalline Powder	Tech.,U.S.P., B.P	400 lbs.	Barrels
Calcium Chloride	$CaCL_2$		White	Crystals or Powder	Technical	600 lbs.	Drums
Calcium Oxide	CaO	Lime, Burnt	White	Lumps	Technical	50 lbs.	Drums
Carbolic Acid	C_6H_5OH	Phenol	White	Crystal, Liquid	Fused U.S.P.	1-5-10-25-50 lbs.	Drum or Gals.
Carbon Bisulphide	CS_2	Carbon Disulfide	Colorless	Liquid	Technical	500 lbs.	Drums
Chromium Chloride	$CrCL_3.6H_2O$	Chromium Trichloride	Green	Crystal	Technical	1 oz.-4 oz.-16 oz.	Barrels
Chromic Acid	CrO_3	Chromium Trioxide,	Reddish Brown	Crystal	Tech.,U.S.P.,B.P	400 lbs.	Drums
Chromic Sulphate	$Cr_2(SO_4)_3$		Violet or Red	Powder	Tech.,U.S.P	350 lbs.	Barrels
Cobalt (ous) Nitrate	$Co(NO_3)_2.H_2O$		Red	Crystals	Technical	400 lbs.	Barrels
Common Salt		See Sodium Chloride					
Cupric Acetate	$Cu(C_2H_3O_2)_2.H_2O$	Copper Acetate	Greenish Blue	Powder	Tech., U.S.P.	300 lbs.	Barrels
Cupric Arsenite	$Cu\ HAsO_3$	Copper Arsenite	Light Green	Powder	Technical	110 lbs.	Kegs
Cupric Carbonate	$Cu_2\ (OH)_2CO_3$	Copper Carbonate	Green	Powder	Technical	225 lbs.	Barrels
Cupric Chloride	$CuCL_2.2H_2O$	Copper Chloride	Yellow	Powder	Technical	400 lbs.	Barrels
Cupric Nitrate	$Cu(NO_3)_2.6H_2O$	Copper Nitrate	Blue	Crystals	Technical	400 lbs.	Barrels
Cupric Sulphate	$CuSO_4.5H_2O$	Copper Sulphate	Blue	Crystals	Tech., U.S.P.	530 lbs.	Barrels
Ferrous Ammo. Sulphate	$FeSO_4(NH_4)_2SO_4$	Mohr's Salt	Light Green	Crystals	Tech., C.P.	50 lbs.	Kegs-Bottles
Glucose	$C_6H_{12}O_6+H_2O$	Dextrose	White	Lump or Powder	Technical	50 lbs.	Bags-Barrels
Glycerine	$(CH_2OH)_2CHOH$	Glycerol	Colorless	Syrup	Tech.,U.S.P.,B.P.C.P	500 lbs.	Drums
Gold Chloride (ic)	$AuCL_3$		Yellow	Crystals	Technical	½ to 2 oz.	Bottles
Hydrogen Sulphide	H_2S		Colorless	Gas			Bottles
Hydrofluoric Acid	H_2F_2	Hydrogen Fluoride	Colorless	Liquid	Technical	100 lbs.	Carboy-Bottles
Lead Acetate	$Pb(C_2H_3O_2)_2.3H_2O$	Sugar of Lead	White	Crystals or Powder	U.S.P.,B.P	200 lbs.	Kegs
Lead Carbonate, Basic	$2PbCO_3Pb(OH)_2$	White Lead	White	Powder	Technical	100 lbs.	Kegs
Lead Oxide	PbO		Yellow	Powder	Technical	500 lbs.	Barrels
Magnesium Sulphate	$MgSO_4.7H_2O$	Epsom Salt	Colorless	Crystal	Tech., U.S.P.,B.P.	500 lbs.	Barrels
Mercuric Chloride	$HgCL_2$	Mercury Bichloride	White	Crystal Powder	Technical, U.S.P.,B.P.	25-50-100 lbs.	Drums
Mercuric Oxide	HgO	Mercury Oxide	Orange Red	Powder	Technical B.P.	10 lbs.	Cans
Mercurous Chloride	$HgCL$	Mercury Monochloride	White	Crystal or Powder	Technical N.S.P.,B.P.	10 lbs.	Cans
Muriatic Acid	HCL	Hydrochloric Acid	Colorless	Liquid	Technical	125 lbs.	Carboy
Nickle Ammonium Sulphate	$NiSO_4(NH_4)_2SO_4.6H_2O$	Double Nickel Salts	Green	Crystals	Technical	425 lbs.	Barrels
Nickel Carbonate	$NiCO_3$		Bluish Green	Crystal	Technical	300 lbs.	Barrels
Nickel Chloride	$NiCL_2.6H_2O$		Yellow	Scales	Technical	500 lbs.	Barrels
Nickel Sulphate	$NiSO_4.7H_2O$	Single Nickel Salt	Yellow, Green, Blue	Crystals	Technical	300-350 lbs.	Barrels
Nitric Acid	HNO_3	Aqua Fortis	Colorless	Liquid	Technical	143 lbs.	Carboys
Oxalic Acid	$H_2C_2O_4.2H_2O$		Colorless	Crystals	Technical	425 lbs.	Barrels
Potassium Bicarbonate	$KHCO_3$	Baking Soda	Colorless	Crystals, Powder	Commercial N.S.P.,B.P.	220 lbs.	Barrels
Potassium Bitartrate	$KHC_4H_4O_6$	Cream of Tartar	White	Crystals	Tech., N.S.P.,B.P.	200 lbs.	Kegs
Potassium Carbonate	K_2CO_3		White	Powder	CrystalsU.S.P.,B.P	400 lbs.	Barrels
Potassium Cyanide	KCN		White	Lumps	Commercial	200 lbs.	Can
Potassium Ferricyanide	$K_3Fe(CN)_6$		Bright Red	Crystals or Powder	Pure Crystals	350 lbs.	Barrels
Potassium Ferrocyanide	$K_4Fe(CN)_6.3H_2O$	Potassium Prussiate	Yellow	Crystal or Powder	Technical	100 lbs.	Kegs
Potassium Iodide	KI		White	Crystals	CrystalsU.S.P.,B.P.	1-4-16-5 lbs.	Bottles
Potassium Sodium Tartrate	$KNaC_4H_4O_6.2H_2O$	Rochelle Salt	Colorless	Crystal or Powder	Crystals U.S.P.	100 lbs.	Barrels
Potassium Sulphide	K_2S	Potassium Sulfurette	Red	Crystalline	Technical U.S.P.,B.P.	5-10-25 lbs.	Cans
Potassium Sulphocyanide	$KCNS$	Potass. Sulphocyanate	Colorless	Crystals	Commercial	5 lbs.	Tins
Rochelle Salt	$KNaC_4H_4O_6.2H_2O$		Colorless	Crystal or Powder	Crystals U.S.P.	100 lbs.	Barrels
Silver Chloride	$AgCL$		White	Powder	Technical	Bulk, oz., lb.	Bottles
Silver Cyanide	$AgCN$		White	Powder	Technical	8 oz.	Bottles
Silver Nitrate	$AgNO_3$	Lunar Caustic	Colorless	Crystals	Fused	1-5-10 lbs.	
Silver Potassium Cyanide	$AgK(CN)_2$		White	Crystals	Technical	5-10 lbs.	
Silver Sulphide	Ag_2S		Grey-Black	Powder	Technical	16 oz.	Bottles
Sodium Bicarbonate	$NaHCO_3$	Baking Soda	White	Powder	Commercial Pure	350 lbs.	Barrels
Sodium Bisulphite	$NaHSO_3H_2O$		White	Crystals or Powder	Commercial	400 lbs.	Barrels
Sodium Bitartrate	$NaHC_4H_4O_6.H_2O$	Cream of Tartar	White	Powder	Tech. N.P.P.,B.P.	350 lbs.	Barrels
Sodium Borate	$Na_2B_4O_7.H_2O$	Borax	White	Crystals or Powder	Anhydrous, N.S.P.,C.P.	300 lbs.	Barrels
Sodium Carbonate	$Na_2CO_3.10H_2O$	Sal Soda	Colorless	Crystals or Powder	Purity Crystals	350 lbs.	Barrels
Sodium Chloride	$NaCL$	Common Salt	White	Crystals or Powder	U.S.P.,B.P.	350 lbs.	Barrels
Sodium Cyanide	$NaCN$		White	Crystalline Powder	Commercial	5-10-25-50-100 lb.	Drums
Sodium Hydroxide	$NaOH$	Caustic Soda	White	Lump or Stick	Commercial	5-10-25-50-100 lb.	Drums
Sodium Nitrate	$NaNO_3$	Chili Salt Peter	Yellow or White	Crystal or Stick	Commercial	300 lbs.	Barrels
Sodium Phosphate	$Na_3PO_4.12H_2O$		Colorless	Crystals	Commercial	425 lbs.	Barrels
Sodium Silicate	$Na_2Si_3O_7$		White & Grey White	Powder or Lump	Crystal	425 lbs.	Barrels
Sodium Sulphate	$Na_2SO_4.10H_2O$	Glauber Salt		Crystal	Crystal	350 lbs.	Barrel
Sodium Sulphite	$Na_2SO_3.7H_2O$		White	Crystal or Powder	Pure., B.P.	350 lbs.	Barrel
Sodium Sulphocyanide	$NaCNS$		Colorless	Crystal or Powder	Technical	5 lbs.	Cans
Sodium Tartrate	$Na_2C_4H_4O_6.2H_2O$		White	Crystal	Technical	300 lbs.	Kegs
Sodium Thiosulphate	$Na_2S_2O_3.5H_2O$	Sodium Hyposulfite	White	Crystal	Commercial	350 lbs.	Barrel
Stannic Chloride	$SnCL_4$	Tin Chloride	Colorless	Liquid	Technical	100 lbs.	Drums, Bottles
Stannic Oxide	SnO_2	Stannic Anhydride	White	Crystal or Powder	White Pure Gray	100 lbs.	Drums-Kegs
Stannous Chloride	$SnCL_2$	Tin Chloride	White	Crystalline Mass	Technical	100 lbs.	Kegs
Stannous Oxide	SnO	Tin Oxide	Brown-Black	Powder	Technical		Kegs
Stannous Sulphide	SnS						
Stearic Acid	$CH_3\ (CH_2)_{16}CO_2H$		White	Solid	Tech.N.S.P.,B.P.	300 lbs.	Barrels
Sugar of Lead	$Pb(C_2H_3O_2)_2.3H_2O$		White		Technical	100 lbs.	Kegs
Sulphuric Acid	H_2SO_4		Colorless	Oily Liquid	Technical	200 lbs.	Carboys
Sulphurous Acid	H_2SO_3		Colorless	Oily Liquid	Technical, B.P.	200 lbs.	Carboy
Tartaric Acid	$CO_2H.(CHOH)_2.CO_2H.H_2O$	Acid Dextrotartaric	Colorless	Crystal	Tech.,N.S.P.,B.P	400 lbs.	Barrel
Water Glass	Na_2SiO_3	Sodium Silicate	White to Grey	Lump or Powder	Pure Crystal	425 lbs.	Barrel
Zinc Carbonate	$ZnCo_3$		White	Crystalline Powder	Technical	300 lbs.	Barrel
Zinc Chloride	$ZnCL_2$	Butter of Zinc	White	Crystal or Granular	Tech., U.S.P.,B.P.	600 lbs.	Barrel
Zinc Cyanide	$Zn(CN)_2$		White	Powder	Technical	10-50-100 lbs.	Drums
Zinc Oxide	ZnO		White	Powder	Tech., U.S.P.,B.P.	325 lbs.	Barrel
Zinc Sulphate	$ZnSO_4.7H_2O$	White Vitriol	Colorless	Crystal	Tech., U.S.P.,B.P.	400 lbs.	Barrel
Zinc Sulphide	ZnS		Yellowish	Powder	Technical	400 lbs.	Barrels

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VOL. 73 NO. 24

Urge the Educational Order

THREE weeks ago the proposal to legislate authorization for educational munition orders, and to appropriate adequate funds to make the placement of such orders an immediate means of affording unemployment relief, was explained in *American Machinist* in an article by Assistant Secretary of War Frederick H. Payne, and advocated editorially.

The proposal has met with general approval, of which the comments published elsewhere in this number are sufficient proof. It remains to persuade the Congress now in session that the proposal is sound and that it will provide immediate relief of unemployment in the metal working field.

Many of those who have sent in their comments for publication have sent either copies or separate letters to their Senators and Representatives. If you have not already communicated with your Congressman, do so at once. The essence of the success of the proposal lies in immediate action. Men are unemployed now, and they need jobs now. Do not delay your letters.

Danger Signs

FOR some little time American business men have been showing signs of gunshyness where Russian orders were concerned. Evidently their trepidation is justified, for danger signs are multiplying. The strange trial which is still in progress as this is written is one of the signs. How any sober citizen of any country can take the carefully framed testimony of the witnesses seriously is hard to grasp. And why the elaborate radio hook-up if the testimony to be presented is not carefully prearranged?

Possibly the psychology of the Russian is so different from that of the Anglo-Saxon that it sounds reasonable to him for doomed traitors to testify as these eight engineers and professors are testifying, but to a Westerner it is inconceivable that a determined plotter could so suddenly side with the men against whom he has been plotting. Our bad men are bad to the end, and go to the gallows or the chair with a smile or a curse, or in stony silence.

The trial is a danger signal that all is not well in the land of the Bear. And so is the recent statement that the five-year plan is a year ahead of time—a statement, by the official in charge of the plan, that does not coincide very well with published statements of foreign experts telling of failures in particular instances and of the exasperating difficulties encountered with Russian officials. And so is the sudden accessibility of the head of the Soviet government to foreign correspondents, after years of inaccessibility. All in all, those who do business with Soviet Russia will do well to tread cautiously.

Psychology and Steam Turbines

THERE is a certain hum in the turbine room of some power plants that has remarkable "goat-getting" qualities if we can judge by its effect on occasional visitors and on those whose duty keeps them within range of the sound during their working shift. Men contend that the constant, monotonous hum, in never changing pitch, is not only nerve racking but also induces drowsiness.

Whatever the effect, it is stated that accidents sometimes occur because operators are made drowsy by the constant hum. One such "drowsying" recently tied up a large plant by a mysterious short circuit—a tool was dropped across two live wires.

Psychologists recognize the effect of sound, or noise, on the individual. And one who visited this plant after the accidental shut-down recommended a ten minute rest period in each working hour, to be spent out of sound of the turbines and in the open air if possible. This rest period was suggested not entirely for the operator's benefit but to prevent expensive accidents, such as the one mentioned.

If there are nerve racking noises in your plant that cannot be eliminated, it may be possible to minimize their effect, not only for comfort but for safety and economy as well. At any rate, the question is worth investigation.

SHOP EQUIPMENT NEWS

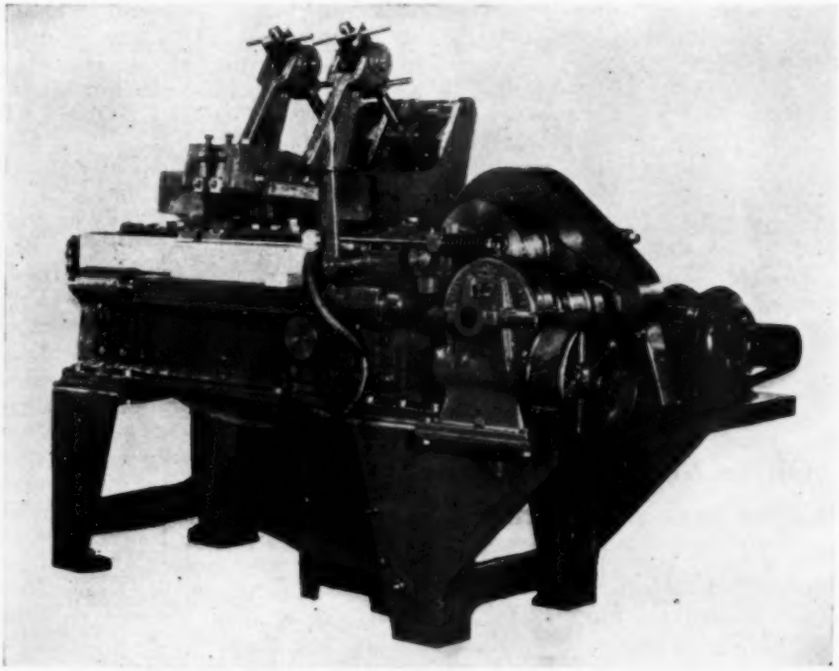
Thomson-Gibb Universal Power-Driven Butt Welder

With the equipment shown, the universal power-driven butt welder announced by the Thomson-Gibb Electric Welding Company, Lynn, Mass., and Bay City, Mich., is practically a universal machine. It is suitable for the butt welding of certain classes of rims, or for the welding of comparatively wide thin sections of strip stock, or condensed sections within the capacity of the machine. It is equipped with universal type air-operated, open-end clamps. Special clamps and platens can be applied for special work. The machine is equipped with a 200-kva. water-cooled transformer protected from flash.

The air-operated clamps are operated through adjustable toggle links, permitting wide adjustment of the jaw opening to take care of a great variety of shapes. The clamp bracket, clamp, and clamp arms are made of cast steel. All pins are bronze bushed. Dies and jaws will take up to 7-in. wide stock, and jaws are so mounted that they can be removed quickly and replaced. The water-cooled dies are made of hard-rolled copper, and can be had in various shapes to conform to the work to be done.

The drive unit consists of a 2-hp. motor connected by belt to a gear reduction unit that in turn actuates the clutch shaft. From this point power is taken to the shaft carrying the main push-up pressure cam. This pressure cam is of large diameter and wide face to insure long life. Normal operating speed is 10 to 15 r.p.m. for the pressure cam, depending on the class of work.

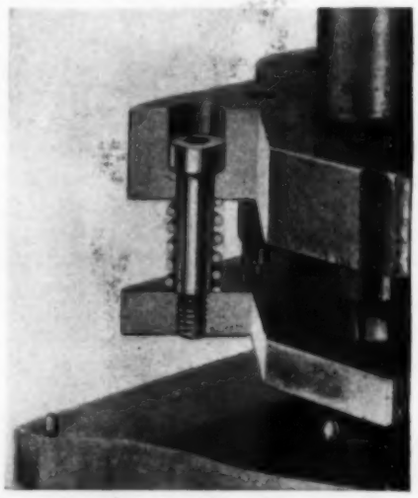
The valve for operating the clamps is controlled by a treadle, so arranged that both clamps operate in unison. The cycle of operation is as follows: Work is inserted in dies; the foot valve lever is depressed; both clamps close; the clutch lever is tripped by hand; the machine goes through its welding cycle; the clamps open automatically; and the platen returns to the open or loading position. The capacity of the machine is up to approximately 2 sq.in., depending on the nature of the work and cycle of operation.



Butt welding capacity of approximately 2 sq.in. is embodied in the Thomson-Gibb Universal Power-Driven Butt Welder

Allen Socket-Head Shoulder Screws

Cold-drawn, socket-head shoulder screws are now being manufactured by the Allen Manufacturing Company, 133 Sheldon St., Hartford, Conn. These screws are stocked in several body diameters and many shoulder lengths adapted for holding together a great variety of machine parts and for cam attachments. These standardized screws are more economical to use than those manufactured by individuals. The screws are heat-treated and have great resistance to wear.



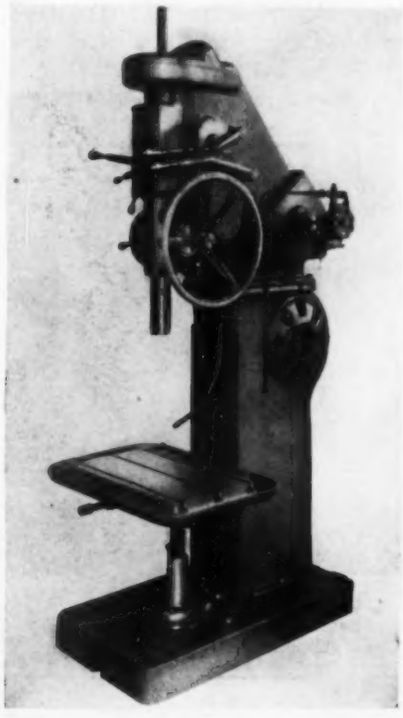
Showing how Allen Socket-Head Shoulder Screws are employed as stripper bolts in production die work

These socket-head screws are made in four sizes of hexagonal sockets—$\frac{5}{16}$, $\frac{1}{4}$, $\frac{5}{16}$, and $\frac{3}{8}$ in. across flats. Corresponding shoulder diameters are $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, and $\frac{3}{4}$ in. Shoulder lengths for the $\frac{3}{8}$-in. size range from $1\frac{1}{4}$ to 4 in., for the $\frac{1}{2}$-in. size from $1\frac{1}{4}$ to 5 in.; for the $\frac{5}{8}$-in. size from $1\frac{1}{2}$ to 6 in., and for the $\frac{3}{4}$-in. size from $1\frac{1}{2}$ to 8 in.

Barnes No. 201¼ Self-Oiled, All Geared Drilling and Tapping Machine

Capacity to drill 1¼-in. holes in S.A.E. 1035 steel is found in the No. 201¼, general-purpose, self-oiling, all-geared, drilling and tapping machine developed by the Barnes Drill Company, 814 Chestnut St., Rockford, Ill. The distance from the center of the spindle to the face of the column is 10 in. Six quick-change geared speeds and six quick-change geared feeds are other features.

The drilling head is a unit, containing all working parts, including the pump for the self-oiling system and a coolant pump. These heads may be used conveniently in gang style of two to six spindles. The head is bolted to the column, and provides for the use of a raising block, where greater distance is required between the spindle nose and table or base.



Six quick-change speeds and six quick-change geared feeds are available on the Barnes No. 201¼ Self-Oiling, All Geared, Drilling and Tapping machine, which has capacity to 1¼-in. holes in steel

As in other drilling machines of Barnes design, the spindle has six splines, preventing binding in the crown gear hub. A ball thrust bearing is provided for the spindle sleeve. Speed change gears are of chrome-nickel steel, heat-treated. Spiral crown gears are forged and hardened. The six quick changes of spur-geared speeds eliminate the usual worm and worm gear and save maintenance costs. All spur feed gears are entirely enclosed inside the main frame. Operating levers are extended to the front of the machine for ease of control, and both the fast and slow feed control levers are located conveniently at the front. An automatic stop is also provided.

Timken bearings are used for all speed change shafts and spiral crown gears, the drive shaft being mounted on ball bearings. The motor is of the flanged type, and is built into the column. A standard type motor can also be fitted to the outside of the column at the rear. In either case, the motor is connected to the drive shaft by means of a silent chain or V-belt drive. A 3-hp. motor is required. On the drive shaft is located an inclosed, self-oiling multiple-disk clutch gear for driving with band brake. For tapping, a reversing multiple-disk clutch and two spiral bevel gears are added, controlled by a convenient lever.

Specifications: Height of drill to top of spindle, 95 in.; maximum distance from table to spindle, 33½ in.; maximum distance from spindle to base, 46 in.; table surface 15x24 in.; travel of spindle, 12 in.; travel of table, 17 in.; spindle taper, No. 4, as standard; floor space, 31x50 in.; net weight, with motor and starter, 1,840 lb.

Oliver No. 287 Wood Shaper or Variety Molder

The Oliver Machinery Company, Grand Rapids, Mich., has developed the No. 287 ball bearing shaper. Because of the high-speed spindle, it is possible to feed the stock to the cutters with or against the grain. The table is 36 in. square and 36 in. from the floor. Larger tables can be furnished. Dust chutes under the table are cast integral with it to prevent accumulation of dust near the spindle. An 11-in. hole in the center of the table has three large rings with flanges, the smallest of which has an inside diameter of 2 in., allowing the spindle adapter to rotate freely.

A detachable spindle is used on this shaper. The spindle has wick-filter oil lubrication, preventing dust from entering the ball races. The spindle is arranged with a brake connected to an automatic cut-off switch operated by a foot lever.

Three types of drive are available. The first is a motor on the spindle. The motor, yoke, and spindle are raised and lowered as a unit by means of a handwheel. This type of drive requires the use of a frequency changer or motor-generator set, to obtain speeds of 6,000, 7,200, or 8,400 r.p.m. respectively.

If desired, this machine may also be arranged for a belted motor drive operating with a 3,600-r.p.m. ball bearing motor mounted in a vertical position, an endless fabric belt transmitting power to the spindle. In the third method, back of the shaper spindle yoke is suspended a 3,600 r.p.m., vertical, ball-bearing motor in a self-contained adjustable arrangement, with a twin V-belt type of drive reaching to the lower end of the shaper spindle to give 7,200 r.p.m.

Specifications: vertical spindle adjustment, 6 in.; length of collars, 8½ in.; diameter of collars, 1¼ in.; front edge of table to spindle, 18 in.; floor space, 26 x 27 in.; power required, 5 hp., and weight, 1,350 to 1,850 lb., depending upon the drive.

A booklet on this development is available.

Buffalo 10-Inch Heavy-Duty Production Drill

The 10-in. heavy-duty production drill announced by the Buffalo Forge Company is a large-range, bench-type unit capable of work on a production basis. Bronze bearings on the spindle and pulleys assure easy running. A quick-return spring on the spindle and hand knobs for rack and pinion adjustment of the belt, save time during operation. The oiltrough table provides a working surface 7 in. square. Drive is by means of a ¼-hp. vertical ball bearing motor through a 3-step V-belt and cone sheave on the spindle.

Specifications: Height of drill, 32 in.; capacity, ½ in. in cast iron; spindle speeds, 3,000, 1,750 and 850 r.p.m.; distance from column to center of drill, 5⅛ in.; spindle travel, 3½ in.; maximum distance from chuck to table, 11½ in.; vertical movement of table, 10 in.; and weight with motor, 105 lb.

Spicer Furnace-Conveyor Belts

For use in continuous furnaces and quench tanks, Ryan, Scully & Company, 3711 Wissahickon Ave., Philadelphia, Pa., have developed two types of link belts. One is the link-space-link-space type, and the other is a solid-surface link type.

Fig. 1 shows a continuous heat-treating furnace at the plant of the Penn Brass & Copper Company, Erie, Pa., for annealing copper tubing. This shows the charging conveyor of Spicer flexible steel belt. A similar conveyor is located at the discharge end. The conveyor within the furnace is of the same construction, except that it is made of heat-resisting alloy. These belts present a metal surface 60 per cent of the total area, as the voids are not objectionable for handling material where the size or shape is such as to preclude the possibility of dropping through or wedging in the open spaces. This type of belt weighs approximately 3 lb. per sq.ft.

Where small parts are to be handled, the 90 per cent belt, shown in Fig. 2, is used. Parts ⅛ in. or larger can be handled without wedging in the belt. This belt has a flange on each side to prevent parts from rolling off. The weight is approximately 4¾ lb. per sq.ft.

Both of these belts are flexible and non-stretching and non-shrinking. The openings can be made to suit different sizes of stock. They are guaranteed for 2,000 hours minimum life at 1,600 deg. F.

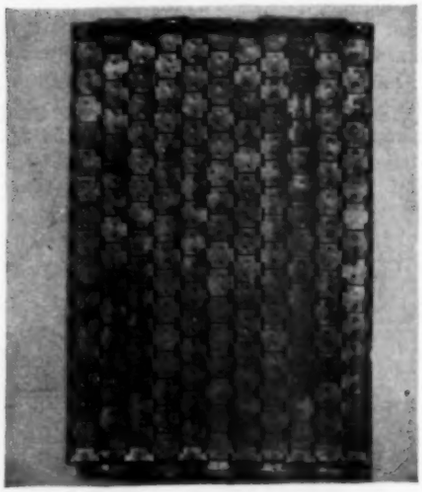


Fig. 2—Parts ⅛-in. and larger will not wedge in this Spicer Furnace-Conveyor Belt

Monitor Oil-Immersed Thermaload Starter

Across-the-line, full voltage starting is permitted by means of the oil-immersed "Thermaload" starter announced by the Monitor Controller Company, Baltimore, Md. This device is equipped with overload and low-voltage protection, and consists of a magnetic contactor mounted on a panel with a thermal relay, and enclosed in an oil-tight box. The oil completely immerses the contactor and the contacts of the relay.

This starter gives positive protection to polyphase and single-phase

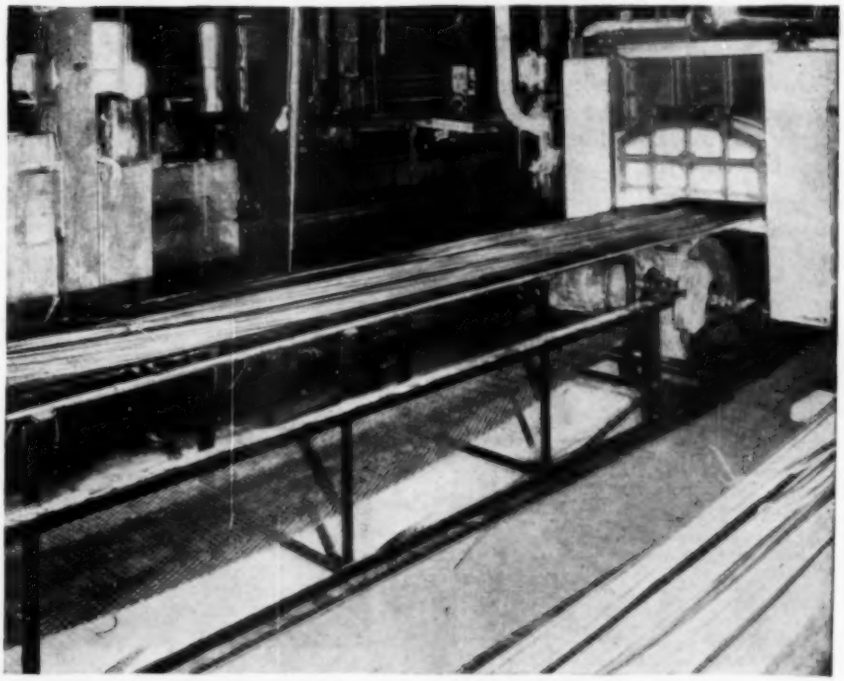
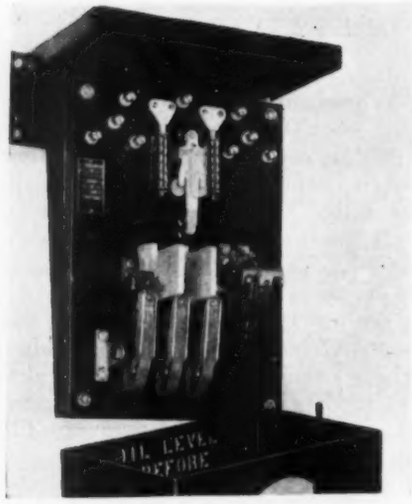


Fig. 1—Application of Spicer Steel Belt to a continuous annealing furnace



Enclosing box removed from Monitor Oil-Immersed Thermaload Starter to show the magnetic contactor and thermal relay

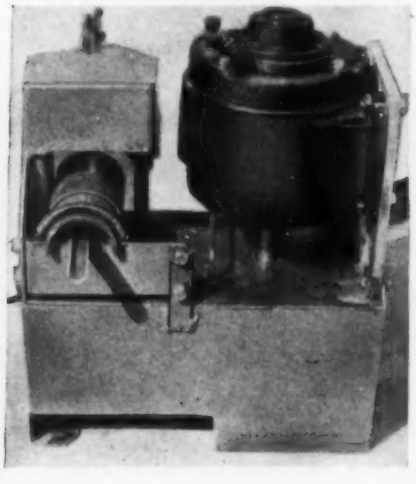
motors both while starting and while running. It will prevent damage to polyphase motors from running single-phase, in case one of the phases goes dead.

The N.E.M.A. ratings are as follows: 7½ hp. at 110 volts; 15 hp. at 220 volts, and 25 hp. at 440 volts.

Coeur d'Alene Precision Reagent Feeder

Precision reagent feeders, having possibilities for feeding acids to pickling tanks and plating tanks, have been developed by the Coeur d'Alene Hardware & Foundry Company, Wallace, Idaho. The motor-driven, totally enclosed type illustrated is used especially for small quantity feeding of liquids. It is regularly fitted with a 110-volt, single-phase, 60-cycle motor. Another type, known as the "Airmatic," is intended for larger quantity feeding of reagents, in which agitation by the air lift is more beneficial than otherwise.

Constant feed is given by means of these reagent feeders and the feed may be adjusted. A steady drop-by-drop or a continuous stream delivery can be effected.



Galland-Henning No. 12 PC Metal-Scrap Press

Mechanical baling of metal scrap is the function of the No. 12 PC press announced by the Galland-Henning Manufacturing Company, Milwaukee, Wis. Loading space of the charging box measures 48 in. long, 16 in. wide and 13 in. deep. Final size of the bales produced is 5x5x13 in., and the weight of a bale is approximately 40 lb. in copper. Capacity of the unit is about 750 to 1,250 lb. of scrap per hour.

A sturdy plunger drives the ram forward. The hydraulic cylinder is of forged steel, and the ram has an outside packed gland. A simple screw-type operating valve is employed.

Fig. 2 at *A* shows a close-up of the charging box with the cover held back, showing the action of the powerful hardened steel "jaws" as they close in to complete a bale. At *B* in the same figure is shown a completed bale, and the ram just ready to return to the starting position. The steel jaws are cammed into position at the end of a stroke by inclined side walls

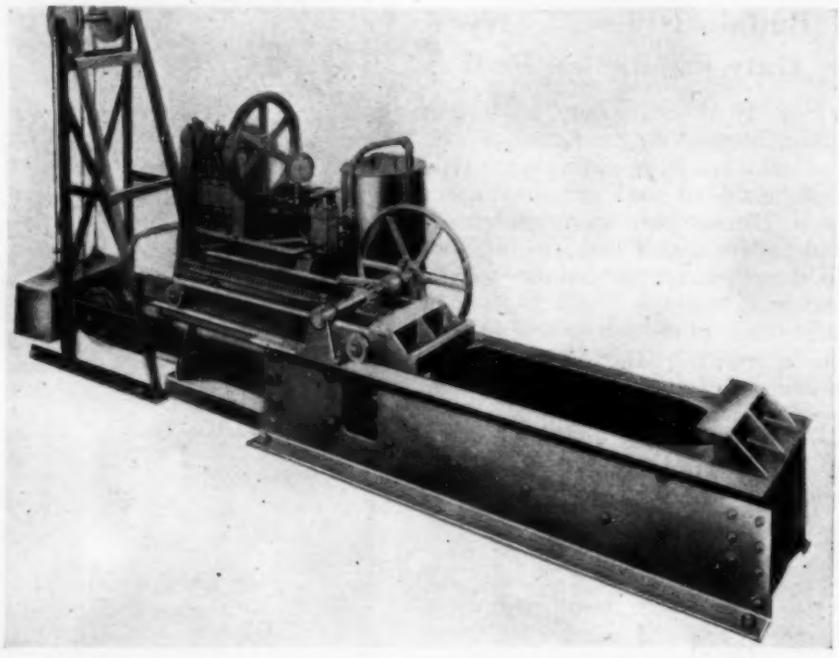


Fig. 1—Galland-Henning No. 12 PC Metal-Scrap Press, which has capacity for 750 to 1,250 lb. of copper, aluminum, or light steel sheet scrap per hour

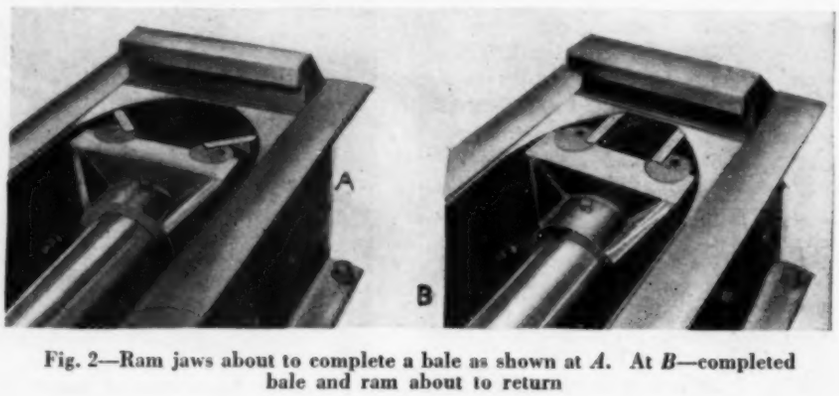


Fig. 2—Ram jaws about to complete a bale as shown at *A*. At *B*—completed bale and ram about to return

at the end of the charging box. They are opened by spring pressure. The ram is returned by a counterweight supported in a structural frame.

Wazau Hardness Tester

A Wazau hardness tester for Brinell tests, and also arranged to measure the depth of indentation similar to the Rockwell method, has been placed on the market by the Southwark Foundry & Machine Company, Testing Equipment Division, Philadelphia, Pa. The tester is suitable for both shop and laboratory use. It is light in weight, and no electrical connections are necessary.

Wasau Hardness Tester which is arranged for measuring both diameter and depth of impression

The load is applied by a hand-driven screw and measured by an elastic precision ring dynomometer and dial graduated in 10-kg. divisions. The vertical opening of the press is 4 in., and can be decreased by inserting blocks. The supporting table is of the overhung type to accommodate ring-shaped pieces.

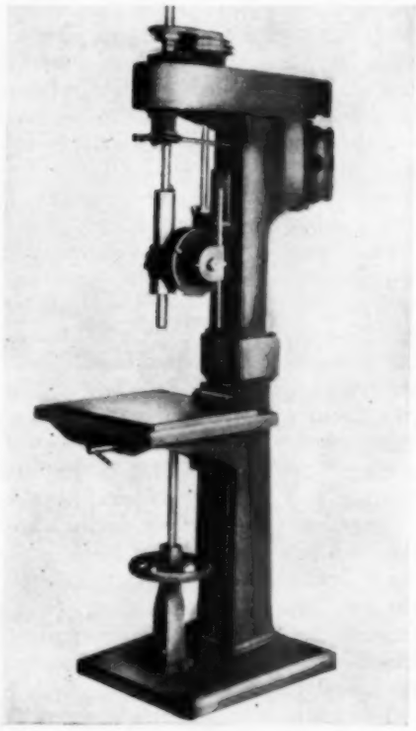
An innovation in this machine is the arrangement of the hollow bronze screw containing the main screw. It is rotated automatically when turning the main screw under small loads, but at higher loads the screws disengage automatically, letting the main screw exert the final load. By this construction, the diameter of the smaller screw can be made reasonably small, enabling easy operation of the machine.

The indentation produced is measured by a special instrument furnished with the machine. The diameter of the impression is read in hundredths of a millimeter. Measurement of the depth of impression can also be taken with the Wazau tester, by observing a scale geared to the main screw. It indicates the vertical movement of the spindle in hundredths of a millimeter. Scale divisions are of sufficient width to permit estimating to fifths, equivalent to 0.002 mm. Rockwell values are obtained by multiplying the readings of this scale by five.

Reid Type U Drilling Machine With Power Feed

A power feed mechanism has been applied to the Type U drilling machine manufactured by the Francis Reid Company, Worcester, Mass. The power feed is thrown on or off by a lever and also has an automatic knock off. V-belt drive is employed, using an eccentric cone for tightening the belts.

Three feeds are available, 0.004, 0.008, and 0.012 in. per revolution. The machine takes up to $\frac{5}{8}$-in. drills and has four speeds, two electrical and two mechanical. The electrical speeds are controlled by a drum switch. A ball-bearing drill spindle is employed.



Reid Model U Drilling Machine with Power Feed

Bijur System of Central Lubrication

Clean oil in predetermined quantities is supplied simultaneously to all bearings on a machine by the Bijur system of central lubrication developed by the Bijur Lubricating Corporation, 250 W. 54th St., New York, N. Y. A single depression of the pump lever once every three or four hours is all that is required to lubricate every bearing on the machine. Control of the oil flow is accomplished without the use of moving parts. Oils as light as kerosene or as heavy as clear transmission oil can be handled.

The pump and reservoir comprise a self-contained unit and may be located at any convenient place on the machine. Depression of the pump handle loads the cylinder shown in Fig. 1 with a predetermined quantity of oil, and release of the handle places this oil under a pressure of approximately 50 lb. per sq.in. As the lines are always maintained full of oil, flow begins immediately from each drip plug, irrespective of its distance from, or height in relation to, the reservoir. The drip plugs apportion the measured charge of oil delivered by the pump in accordance with their respective flow capacities. Seven separate flow rates from approximately $\frac{5}{8}$ of a drop per min. to 46 drops per min. are available.

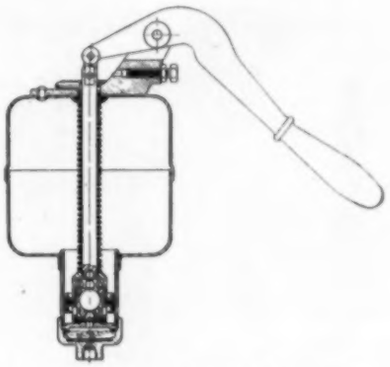


Fig. 1—Bijur Hand-Operated Pump and Reservoir for industrial lubrication systems. Cylinders trapping 1 or 2 cu.in. of oil per stroke are built

When the pump is operated, the piston is raised against the downward pressure of the coil spring. During

the upstroke, a charge of oil is drawn through the oil ports in the piston and around the ball into the space under the piston. When pressure is removed from the operating lever, the coil spring forces the piston down, and the upward rush of oil lifts the ball valve to its seat in the piston. The measured charge of oil trapped in the cylinder below the piston is then forced into the lines by the pressure of the spring. The piston stroke is adjustable by means of a stop screw and lock nut, so that any predetermined amount of oil may be fed into the lines. A dense felt filter disk prevents dirt or solid matter from entering the system. The pump and reservoir units are available in three sizes: 1-qt. reservoir with a

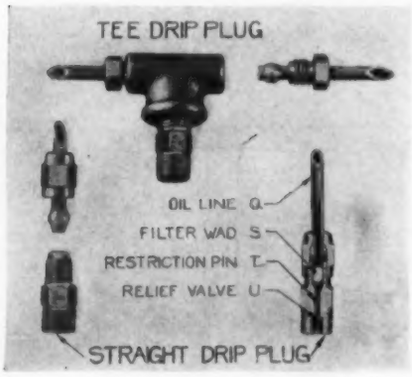


Fig. 2—Construction of Dijur T-head drip plug

1-cu.in. pump, another 1-qt. reservoir with a 2-cu.in. pump, and a 2-qt. reservoir with a 2-cu.in. pump.

Drip plugs used in the system, as shown in Fig. 2, contain three elements: a felt filter wad, a restriction passage containing a pin, and a relief valve. The restriction pin nearly fills the cylindrical passage in which it lies. Clearance between the pin and the passage wall determines the rate of flow of the oil. The relief valve is normally held closed by a spring, but opens under a pressure of approximately 5 lb. per sq.in., allowing oil to flow. When the flow ceases, the pressure drops to less than 5 lb. per in., and the valve closes, preventing drip, and keeping the lines full of oil. The valve is faced with a flexible material that eliminates leakage. This method of delivering oil permits the lubricant to build up a film on the bearing surface, instead of forcing it out of the bearing through the slack side.

Drip plugs are made in three styles: (a) straight or terminal types to be screwed directly into the bearing; (b) tee-head drip plugs made with two, three, and four outlets for use where lines are to be carried to points beyond the bearings which they lubricate, and (c) junction drip plugs to be used in connection with tee-head drip plugs.

Minster Nos. 7 and 8 Open-Back Inclinable Presses

Two additions have been made to the line of open-back inclinable presses manufactured by The Minster Machine Company, Minster, Ohio, bringing the total number to eight. These two units are the largest of the line, exerting ram pressures of 71 and 88 tons, respectively for the Nos. 7 and 8 sizes, and weighing 12,200 and 23,000 lb. respectively in the single geared models.

The main bearings in the frame overhang so that the entire upward thrust of the crankshaft is carried by the frame and not by the cap. These main bearings are cast-iron bushed so that it is not necessary to rebore the frame should the bearing become scored or worn. The backshaft bearings on the geared-type presses are bronze bushed, and the frames of both models have tie-rod lugs.

The clutch employed on the Nos. 7 and 8 presses of both the fly-wheel and geared types is of the block or jaw type, consisting of a large sliding collar that engages with a steel facing secured to the gear or fly wheel. Both the block and facing are made of high-carbon electric furnace steel castings, and the inserts acting as driving and backing blocks in the sliding collar and wheel facing, are made of heat-treated alloy steel. For the fly-wheel type machine, the clutch has two jaws and a backlash pin to prevent the crankshaft from running ahead of the driver. For geared machines the clutch has three jaws.

The frame is raised and lowered by means of ratchet-operated screws. Supporting trunnions on the frame are so located that, when the press is inclined, the height from the floor to the center of the dies does not change materially. This mechanism is special.

Both machines are equipped with a positive cross-bar knockout in the slide, and the knockout brackets are attached to the frame instead of the gibs. The connection is of the compensating- ball-joint type. The screw is of high-carbon steel having milled buttress threads instead of U.S.S. threads.

The slide is extra long and moves in long and heavy V-gibs. Adjustment is made from one side only. The ways of the slide are lubricated from the gibs with separate oilers for both front and back. Punch stems are held in the slide by a clamp cap, which is clamped by bolts extending through to back of slide. Lugs are cast on the sides to facilitate the fastening of dies.

All working surfaces are provided with means for ample lubrication. Either Dot, Alemite, or Zerk fittings and pressure guns are furnished as standard equipment. One-shot lubrication systems can be furnished at additional cost.

The crankshaft is of high-carbon

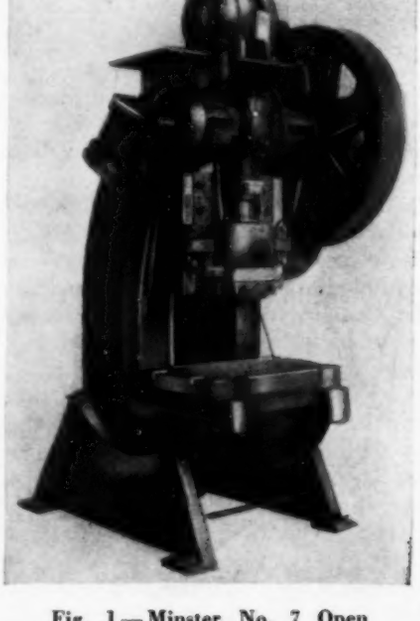


Fig. 1—Minster No. 7 Open Back Inclinable Press, which has a ram pressure of 71 tons

hammered steel, with an enlargement for the clutch body forged integral with the shaft. The cross-sectional area of the crankpin is approximately 50 per cent greater than the cross-sectional area of the crank at the bearings.

If individual motor drive is required, a belted or direct gear drive

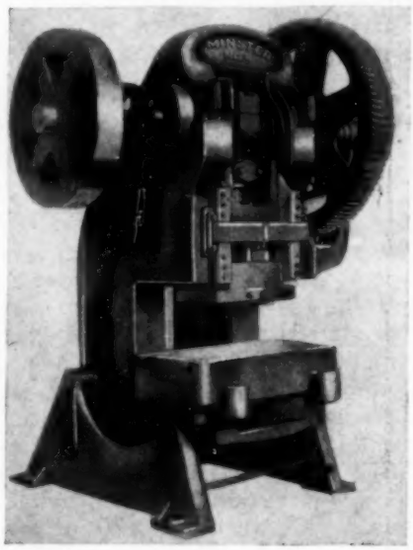


Fig. 2—Minster No. 8 Open Back Inclinable Press affording a ram pressure of 88 tons and weighing 23,000 lb. in the single-geared model

can be had on both the fly-wheel and geared type.

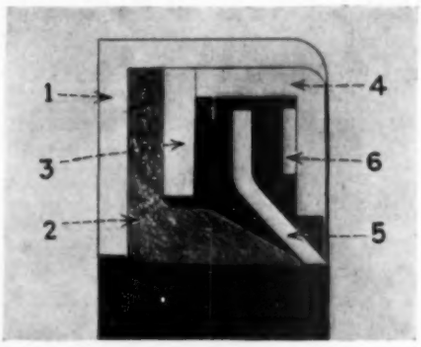
Specifications of the No. 7 press: ram pressure, 71 tons; width of opening in back, 18 in.; width between gibs, 11 in.; area of bolster, from to back, right to left, 23x34 in.; opening in bed, front to back, right to left, 14x20 in.; area of slide, front to back, right to left, 12x10½ in.; distance bolster to slide, stroke down, adjustment up, 11½ in.; stroke, 4 in.; adjustment, 3¼ in.; diameter of hole for punch shank, 2 in.; weight, fly-wheel press, 11,000 lb.; single-geared press, 12,200 lb.; number of strokes respectively, 80 and 40; motor required, 5 hp.

Specifications of No. 8 press: ram pressure, 88 tons; width of opening in back, 21 in.; width between gibs, 17½ in.; area of bolster, front to back, right to left, 27x42 in.; opening in bed, front to back, right to left, 16x 24 in.; area of slide, 15x16½ in.; distance bolster to slide, stroke down, adjustment up, 14 in.; stroke slide, 4 in.; adjustment of slide, 3½ in.; weight, fly-wheel press, 21,000 lb.; single-geared press, 23,000 lb.; number of strokes per min., 80 and 37, respectively; motor required, 7½ hp.

Gits Precision Oil Seal

Dirt, grit, water, and foreign water can be excluded from bearings by the use of the precision oil seal announced by Gits Bros. Mfg. Company, 1846 Kilbourn Ave., Chicago, Ill. This oil seal prevents loss of oil with minimum friction, and operates equally well on horizontal and vertical shaft applications. It is made to seal ball, roller, and plain sleeve bearing enclosures.

As shown in the accompanying cross-section, the oil seal is made up of six parts, which are as follows: (1) An outer retaining member, (2) a leather gasket, (3) the gasket washer, (4) an inner retaining member held in place by 1, (5) a gasket expanding member, and (6) a crimped annular spring for sealing



Cross-section of the Gits Precision Oil Seal, showing the feather-edge leather gasket that is pressed against the shaft by an expanding member 5

the feather-edge gasket against the shaft.

The gasket is beveled to a feather edge rather than being left square. The ring 5 is made to bear against the feather just back of the edge, so that it is held firmly but without excessive pressure against the shaft. The ring 5 feeds down by means of the spring 6 as the leather wears over a long period of service, and thus prevents leakage.

These Gits precision oil seals are available in shaft sizes from $\frac{7}{16}$ to 6 in. inclusive, the outside diameters being 1.127 in., and 7.506 in. for these limits. The widths range from $\frac{3}{32}$ to $\frac{3}{4}$ in. for these limits.

"Four-Grip" Tool Bit Holder

No shifting of the bit during cutting and minimized bit breakage are features of the "Four-Grip" tool bit holder announced by the Four-Grip Tool Company, 107 E. 17th St., Paterson, N. J. As shown by the illustration, the "Mac-It" set screw

"Four-Grip" Tool Bit Holder

forces in a V-block against one edge of the bit and holds it rigidly in its seat. Pressure of the V-block extends over one-third of the length of the bit. The size of the No. 4 holder is $\frac{5}{8}$x1$\frac{1}{8}$x7½ in. long. It takes a bit $\frac{3}{8}$ in. square and weighs 2¾ lbs.

"Ammco" "Round-O-Meter" Gage

A direct-reading indicator for checking roundness and size of objects from ¾ to 6 in. in diameter has been announced by the Automotive Maintenance Machinery Com-

Checking roundness of a piston with the "Ammco" "Round-O-Meter" Gage

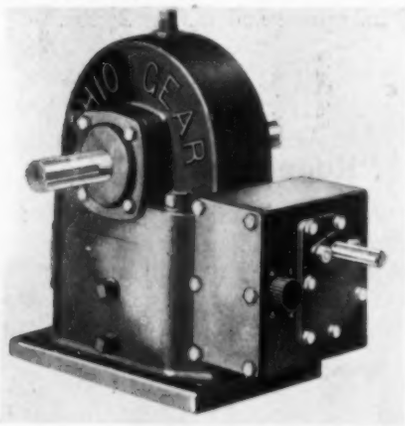
pany, 816 West Washington Boulevard, Chicago, Ill. Readings are accurate to 0.0005 in.

By using "Ammco" gage setting rings, the Round-O-Meter can also be used for direct measurement and comparative checking. Gage setting rings are furnished on special order in any specified diameters, over-sizes or under-sizes, within the range of $\frac{3}{4}$ to 6 in., inclusive.

Ohio Worm-Gear Speed Reducer With 4-Speed Gear Shift

By means of a selective dial, any one of four speeds can be obtained from the worm-gear speed reducer announced by the Ohio Gear Company, 1333 E. 179th St., Cleveland, Ohio. A complete range of sizes from 3 hp. to fractional horsepower sizes of $\frac{3}{8}$ and $\frac{1}{8}$ hp.

In this worm-gear speed reducer, the worm and worm wheel assembly



Ohio Combination Worm-Gear Speed Reducer and 4-Speed Changer Unit, showing the gear-shift knob

provides the main reduction. The speed changer gear ratios can be varied within fairly wide limits, although two alternative sets of ratios, which have been standardized, are usually found sufficient. The first alternative varies the revolutions per minute in the proportions of 1 to 1, $1\frac{1}{2}$ to 1, 2 to 1, and 3 to 1, as compared with the worm wheel revolutions. The alternative standard varies as 2 to 1, 1.87 to 1, 1.66 to 1, and 1.6 to 1. These ratios must be multiplied by the ratio of the worm gear reducer to which the speed-changing part is attached, in order to give the ultimate reduction. Thus, for example, with an 1,800 r.p.m. motor and a 10 to 1 worm-gear reduction, the speeds available at the worm shaft with the first alternative reduction would be 180, 120, 90, and 60 r.p.m.

A hardened and ground steel worm is employed, while the worm wheel is of bronze. Reducer shafts run in ball-bearings and the edges of the speed-changer gear teeth are rounded to facilitate easy engagement. The mechanism is so designed that the "gear shift" dial cannot be operated unless the unit is at rest. Both the box and worm assembly can be arranged for any operating position specified. The speed changing box can also be supplied separately, if desired.

McKinney Model F Roll Forming Machine

Moldings, tubing, and formed sheets can be produced on the McKinney Model F roll forming machine at speeds from three to six times as fast as the best press speeds. These sections can be rolled from strip or sheet stock of brass, copper, zinc, aluminum, steel or stainless steel.

The type F machine, announced by the McKinney Tool & Manufacturing Company, 1688 Arabella Road, Cleveland, Ohio, is built on the unit plan. Each unit carries one pair of work spindles and is entirely self-contained. As many units may be incorporated in a machine as desired. Each unit contains its individual speed reducer. The motor is mounted at the base of the machine and is connected to the drive shaft by a multiple V-belt drive.

The base is a heavy box-type casting and the housings are semi-steel castings. The main housings are grooved to the bed and doweled in place. The front housings are not bolted to the bed, but each slides from front to rear on a guide strip doweled to the bed. These front housings are held at any desired point by clamp bolts in T-slots. This type of construction permits housings to be placed up against the work roll regardless of whether a wide or narrow section is being rolled. Thus, the machine may be used as a standard two-housing machine for heavy work, and by pushing the front housing back until the ends of the work spindles are exposed, a strong outboard machine for light and medium

McKinney Model F Roll Forming Machine employing unit housings, each driven by an integral speed reducer and having the front housing adjustable transversely on the bed

work is available. In many cases it is possible to set up two jobs at the same time.

Rolling speeds of 100 to 150 ft. per min. are practical for most sections, but speeds as high as 650 ft. per min. have been obtained on some jobs. The type F rolling machine is built in two sizes.

Chamfering and Intermittent Recessing Mechanism for Peerless Tooth Chamfering Machine

The City Machine & Tool Works, East Third at June, Dayton, Ohio, has developed a mechanism for chamfering and intermittently cutting or recessing gear teeth on the Peerless tooth chamfering machine. This operation is required for the quiet second-speed transmission gears and four-speed transmissions with quiet third and fourth gears, and also the "free wheeling" type of transmission. It is adapted to such transmission parts as: drive roller spider, mainshaft, third-speed gear, main drive gear, and third and direct-speed clutch. The machine is adapted for chamfering or intermittently cutting and recessing either internal or external gears at production speeds.

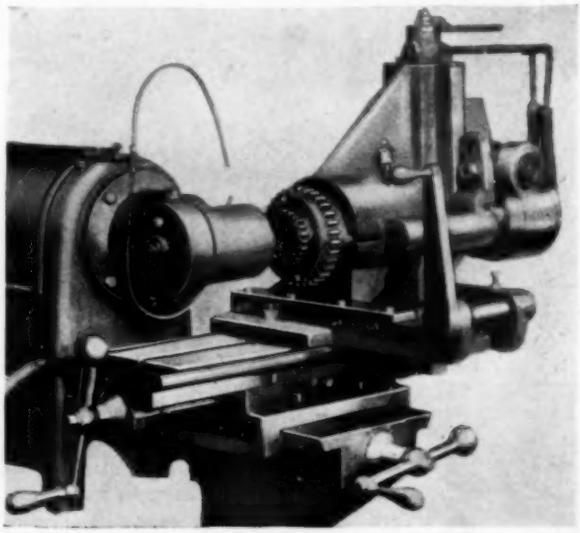


Fig. 1—Close-up of Peerless Tooth Chamfering Machine fitted with a mechanism for chamfering and intermittently cutting or recessing gear teeth of both internal and external gears

Fig. 1 gives a close-up of the entire unit, showing an internal gear mounted in position and just after completion of an operation for recessing every other internal tooth to a depth of $\frac{3}{16}$ in. This operation can also be arranged to chamfer or to round all the internal gear teeth, after the recessing operation. This holds true for teeth on external gears. Located at the rear is a cutting cam to furnish the in-and-out motion, which presents the gear to and from the cutter at every other tooth. This machine can be arranged to recess or to skip practically any number of teeth in any desired ratio.

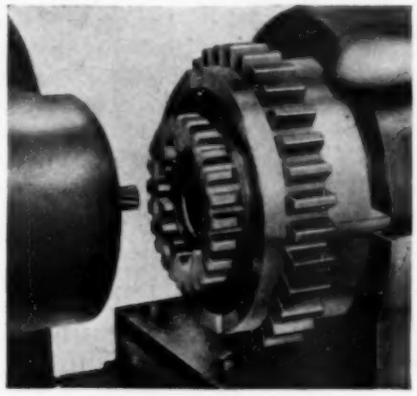


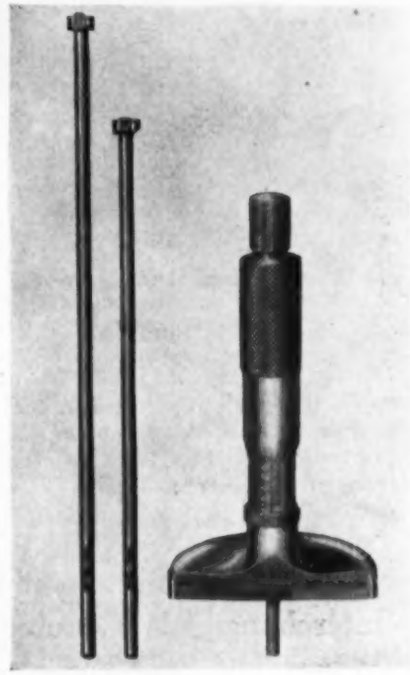
Fig. 2—Internal gear recessed on every other tooth. The process is applicable also to external gears

Fig. 2 gives a close-up of the part itself after completion of the cutting operation. By synchronizing a cutting cam at the rear with an indexing worm, the proper gear tooth is indexed successively in position for chamfering or recessing, whenever the cam reaches the cutting position.

Lufkin No. 312 Micrometer Depth Gage

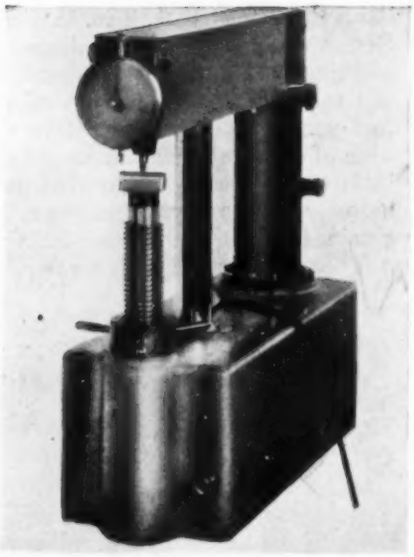
A micrometer depth gage with half-round base has been announced by The Lufkin Rule Company, Saginaw, Mich. This No. 312 gage has a half-round base, 2 in. in diameter, and rods $\frac{3}{32}$ in. in diameter, adapting the gage for use particularly in small places. The balance of the tool permits it to be placed to the edge of the work, and because of the half-round base, a better feel and more accurate readings can be obtained.

The measuring capacity of the tool is from 0 to 3 in. by thousandths. This range is obtained with three interchangeable rods that are securely fastened by means of a knurled cap. A 1-in. movement of the screw is obtained. Each gage is equipped with a patent lock nut to maintain the reading, and can be had with or without a ratchet stop.



"Diamo" Brinell Hardness Tester

Brinell hardness readings are read directly on the "Diamo" Brinell hardness tester placed on the market by the Pittsburgh Instrument & Machine Company, 1026 Reedsdale St., Pittsburgh, Pa. The instrument is operated by a system of weights and levers and the indentation is produced by a diamond semi-ball of 2 mm. diameter under a load of 120 kg. After the test piece is placed in position and the motor is started, it is necessary only to pull out the



"Diamo" Brinell Hardness Tester, which gives Brinell readings directly on a gage

"starter" at the front of the base to apply the load automatically. The load is then released automatically. For soft material the test load can be changed easily from 120 to 30 kg.

National-Cleveland Style B Interchangeable Counterbore and Spot Facer

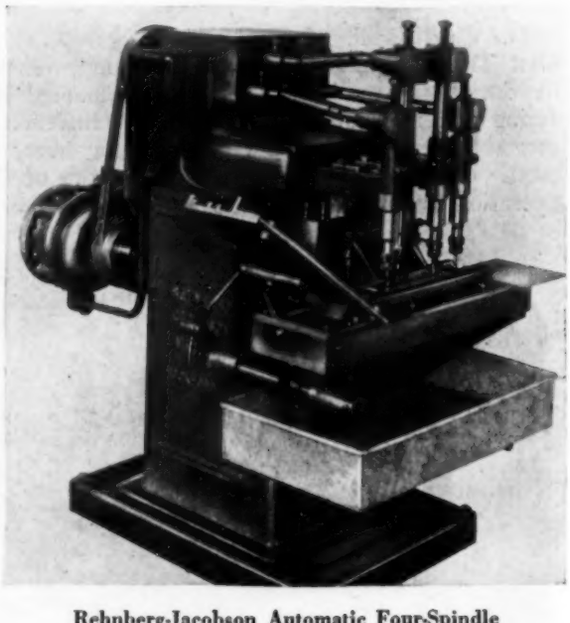
Counterbores and spot facers, which are interchangeable on the same shank, have been placed on the market by the National Tool Company, Madison Ave. at West 112th St., Cleveland, Ohio. The style B tool employs a double-key drive, one key on the cutter and the other key on the holder. Cutters are made of high-speed steel, pilots and holders of alloy steel, all hardened and ground. Cutters are available from $\frac{3}{4}$ to 5 in.

Rehnberg-Jacobson Automatic Four-Spindle Tapping and Drilling Machines

Two multiple-spindle, universal-joint type tapping and drilling machines are being marketed by the Rehnberg - Jacobson Manufacturing Company, Rockford, Ill. Each machine is built around the same base, but the drive mechanism differs.

The tapping machine is capable of tapping 80 $\frac{3}{8}$-in. holes in steel door hinges per minute, but may be adapted for a wide range of work. Drive is by a motor mounted on the rear through V-belts to a gearbox. This gearbox contains a train of hardened steel gears and a reversing clutch, cam controlled. Power is transmitted to the tapping spindles by means of universal joints and telescoping shafts, final drive being through spiral gears. With this type of drive a wide range of spindle spacing is possible. For close centers, the spindles are made in pairs with a long and a short spindle in each pair. The work is fed automatically from a magazine slide and is raised into the taps by cam action. Positive drive from the gearbox to the camshaft is by silent chain.

In the four-spindle drilling machine, the motor is direct-connected to the gearbox by means of a flexible coupling. No reverse clutch is used in this unit, and drive to the feed is by flat belt instead of chain. Except for the tapping arrangements, both machines are of similar design.

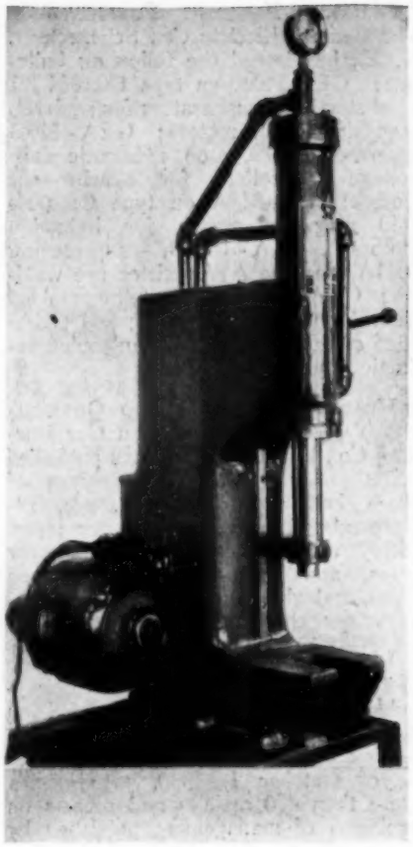


Rehnberg-Jacobson Automatic Four-Spindle Tapping Machine

Once started by push button, the cycle is automatic in each machine, the only function of the operator being to load the magazine feed slide.

"American" Hydraulic Bench Arbor Press

A small hydraulic arbor press that can be attached to a bench or lathe bed has been placed on the market by the American Broach & Machine Company, Ann Arbor, Mich. It is driven by a $\frac{1}{2}$-hp. motor, drive being by means of a roller chain. The stroke is 12 in.; diameter of the ram,



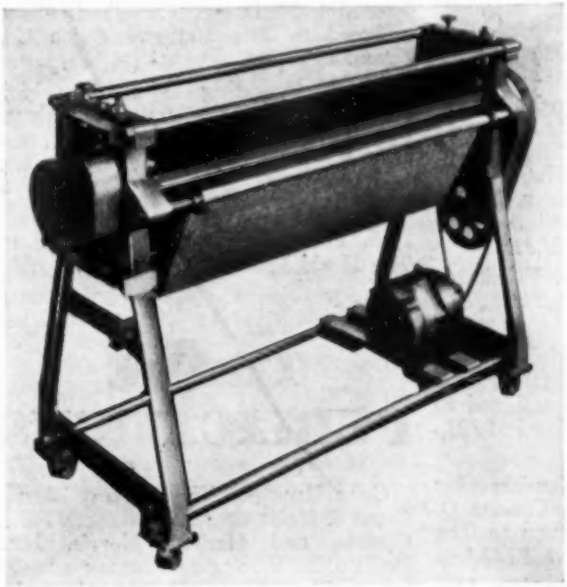
American Hydraulic Bench Arbor Press equipped with a direct reading pressure gage

2 in., and the speed of the ram, 60 ft. per minute. The width of the slot in the table is 2½ in., and the total height of the machine is 41 in. The pump is mounted directly in the column, submerged in oil, the column serving as an oil reservoir. Oil capacity is 4 gal. Maximum ram pressure exerted is 1 ton.

Gray Sheet-Metal Cleaning and Oiling Machine

Machine wiping and lubricating of sheet, with consequent speeding up of production, can be effected by means of the sheet metal cleaning and oiling machine announced by the Gray Hub Company, Detroit, Mich. This machine is claimed to cut labor costs 50 per cent and effects saving on wear of drawing dies. It eliminates scratches before and after finish enameling or painting.

A standard 40-in. portable, motor-driven machine is illustrated. It consists of two brush rolls at the front and two felt rolls at the rear. Sheets are inserted between the brushes until seized by the felt rolls, which draw them through. One pan is provided to receive refuse brushed from sheets, while another is placed under the felt rolls for containing drawing compound to be placed on the sheets, if required. The lower felt roll impregnates the upper roll with compound.



Front view of Gray Sheet-Metal Cleaning and Oiling Machine, having capacity for sheets up to 40 in. in width

PATENTS

NOVEMBER 25, 1930

Metal-Working Machinery

Cutting Machine. Charles Baxter Gray, Millbourne, Pa. *Patent 1,782,420.*

Welding Machine. Verni J. Chapman, Schenectady, N. Y., assigned to General Electric Co. *Patent 1,782,461.*

Centerless Grinding Machine. Ernest R. Seward, Detroit, Mich., assigned to Cincinnati Grinders Incorporated. *Patent 1,782,480.*

Form-Rolling Machine. Frank L. Snyder, Cleveland, Ohio, assigned to The White Motor Co. *Patent 1,782,483.*

Machine Tool (Upright drill). Albert M. Johnson, Rockford, Ill., assigned to Barnes Drill Co. *Patent 1,782,573.*

Machine for Flanging Plate Disks. Otto Wild and Louis Wild, Muri, Switzerland. *Patent 1,782,641.*

Grinding Machinery. Albert Turner, Cincinnati, Ohio, assigned to Cincinnati Grinders Incorporated. *Patent 1,782,669.*

Molding Machine. Thomas O. Morris, Harrisburg, Pa., and John J. Lawlor, Plainfield, N. J., assigned to Automatic Molding Machine Corporation. *Patent 1,782,762.*

Machine for Forming Articles from Sheet Material. Bernard M. Fine, Philadelphia, Pa., assigned to Sanitary Products Corporation of America. *Patent 1,782,777.*

Casting Machine. Carl E. Hunter and De L. Lutz, Memphis, Tenn. *Patent 1,782,898.*

Means for Rolling Tubes. Albert T. Keller, Bethlehem, Pa., assigned to Bethlehem Steel Co. *Patent 1,782,968.*

Machine for Beading and Flanging Metal Barrels. Bror J. Lindgren, Buffalo, N. Y., assigned to Niagara Machine & Tool Works. *Patent 1,782,994.*

Honing Machine. Albert M. Johnson, Rockford, Ill., assigned to Barnes Drill Co. *Patent 1,783,019.*

Machine for Forming Rings of Segmental Pieces. Emile J. Guay, deceased, Swampscott, Mass., by Fred Germain, administrator, assigned to the General Electric Co. *Patent 1,783,040.*

Centrifugal Casting Machine. William D. Moore and Walter Morgan, Birmingham, Ala., assigned to Sand Spun Patents Corporation. *Patent 1,783,094.*

Piston-Ring Burr-Removing Device. Joseph H. Hoern, Saginaw, Mich., assigned to Wilcox-Rich Corporation. *Patent 1,783,120.*

Tools and Attachments

Die Head. Victor R. Koontz, Waynesboro, Pa., assigned to Landis Machine Co. *Patent 1,782,472.*

Flexible Driving Connection for Tool Holders. Bernard P. Schiltz, Cleveland, Ohio. *Patent 1,782,633.*

Cutting Machine. John F. Lawson, Brooklyn, N. Y., assigned to Steel and Tubes, Inc. *Patent 1,782,692.*

Collapsing Taper-Thread Tap. Albert F. Breitenstein, New Haven, Conn., assigned to The Geometric Tool Co. *Patent 1,782,804.*

Form Clamp. Charles E. Hudgin, Chicago, Ill., assigned to Samuel E. Lingle. *Patent 1,782,897.*

Triple-Valve Reamer. James R. Ricketts, Richmond, Calif., assigned to National Air Brake Service, Inc. *Patent 1,782,910.*

Quick-Change Punch and Holder. Clarence F. Sheridan, Detroit, Mich. *Patent 1,783,028.*

Feed Chuck. Frank E. Green, Pittsburgh, Pa. *Patent 1,783,039.*

Sheet-Metal-Bumping-Out Tool. William Ferguson, Flint, Mich. *Patent 1,783,077.*

Bumping-Out Tool. William Ferguson, Flint, Mich. *Patent 1,783,078.*

Furnaces

Heat-Treating Furnace. Horace L. Waisner, Rockford, Ill., assigned to Mechanics Universal Joint Co. *Patent 1,782,451.*

Annealing Furnace. Grant B. Shipley and Henry Alinder, Pittsburgh, Pa., assigned to The International Nickel Co., Inc. *Patent 1,782,481.*

Apparatus for Heating a Pickling Solution. William C. Siefert and George W. Pawel, Clearfield, Pa., assigned to The International Nickel Co. *Patent 1,782,482.*

Apparatus for Charging Furnaces and the Like. Florence C. Biggert, Jr., Crafton, Pa., assigned to United Engineering & Foundry Co. *Patent 1,782,955.*

Rotary-Hearth Furnace. Alan D. Dauch, Pittsburgh, Pa., assigned to George J. Hagan Co. *Patent 1,782,956.*

Electric Heating Furnace. Randal E. Talley, Irwin, Pa., assigned to George J. Hagan Co. *Patent 1,783,155.*

Heat-Treating Apparatus. Randal E. Talley, Irwin, Pa., assigned to George J. Hagan Co. *Patent 1,783,156.*

Processes

Method of Making Drums. William A. Jones, West New Brighton, N. Y., assigned to The Babcock & Wilcox Co. *Patent 1,782,899.*

Method and Apparatus for Feeding Disks to a Closing Mold. Louis T. Frederick, Valparaiso, Ind., assigned to Continental Diamond Fibre Co. *Patent 1,782,989.*

Method of Making Steel Piston Rings. Lewis C. Marshall, Walpole, Mass. *Patent 1,783,047.*

Balancing of Crank Shafts. Claude Clench, Dumfries, Scotland. *Patent 1,783,073.*

DECEMBER 2, 1930

Metal-Working Machinery

Machine for Assembling Nuts. Richard L. Burdsall, Port Chester, N. Y., assigned to Russell, Burdsall & Ward Bolt & Nut Co. *Patent 1,783,218.*

Tube-Tapering Apparatus. Friederich Muller, Elizabeth, N. J. *Patent 1,783,384.*

Cross Tool Slide for Multiple-Spindle Automatic-Screw Machines. Olof Enoch Trobeck, Berlin, Germany, assigned to The National Acme Co. *Patent 1,783,528.*

Spindle-Stopping Mechanism for Metal-Working Machines. Charles Q. Garey, Windsor, Vt., assigned to The National Acme Co. *Patent 1,783,566.*

Locking Device for Lapping Machines. Milton A. Hoyt, East Orange, N. J., assigned to Westinghouse Lamp Co. *Patent 1,783,618.*

Wire-Cutting Mechanism. Allan William Johnson, Newark, N. J., assigned to Westinghouse Lamp Co. *Patent 1,783,620.*

Vertical Turret Lathe. Oscar G. Tweddell, Detroit, Mich., assigned to Frederich Fiesselmann. *Patent 1,783,637.*

Automatic Soldering Machine. John E. Ferguson, Bloomfield, Robert W. Conn, Vauxhall, and Walter Alvah Hoffman, Bloomfield, N. J.; assigned to Westinghouse Lamp Co. *Patent 1,783,642.*

Grinding Machine. Charles G. Trefethen and Albert G. Belden, Worcester, Mass., assigned to Norton Co. *Patent 1,783,755.*

High-Speed Thread-Rolling Machine. James A. Kinney, Lebanon, Pa., assigned to Bethlehem Steel Co. *Patent 1,783,796.*

Machine for Making Welded Reenforcing Fabrics. William H. Sommer, Peoria, Ill. *Patent 1,783,944.*

Wire-Fence Machine. William H. Sommer, Peoria, Ill. *Patent 1,783,946.*

Tools and Attachments

Gaging Mechanism. Zenas P. Canpee, Waterbury, Conn., assigned to The Waterbury Farrell Foundry and Machine Co. *Patent 1,783,404.*

Chuck. George E. Garno, Worcester, Mass., assigned to The Heald Machine Co. *Patent 1,783,420.*

Threading Die. William J. Hogg, Cleveland, Ohio, assigned to The National Acme Co. *Patent 1,783,539.*

Die-Chaser-Grinding Fixture. William J. Hogg and Frederick Neumann, Cleveland, Ohio, assigned to The National Acme Co. *Patent 1,783,540.*

Tool Holder. William J. Hogg and Frederick Neumann, Cleveland, Ohio, assigned to The National Acme Co. *Patent 1,783,541.*

Chuck-Operating Mechanism for Automatic Spindle-Screw Machines. Charles Q. Garey, Windsor, Vt., assigned to The National Acme Co. *Patent 1,783,565.*

Work Holder. Raymond M. Woytych, Fond du Lac, Wis., assigned to The Heald Machine Co. *Patent 1,783,596.*

TRADE PUBLICATIONS

GEAR BLOCKS. The Herbert Morris Crane & Hoist Co., Ltd., Niagara Falls, Canada, and Herbert Morris, Inc., Buffalo, N. Y., are distributing a booklet entitled "The Master Gear by Morris," showing pictorially the construction and application of Morris gear blocks.

GENERAL ELECTRIC PUBLICATIONS. The General Electric Co., Schenectady, N. Y., has issued the following bulletins: GEA-140A on type CR1034-K1 hand starting compensators for squirrel-cage induction, motors; GEA-579B superseding 579A, on automatic full-voltage controllers for synchronous motors; GEA-841A on type CR7006-D40 magnetic switch for induction motors; GEA-1031B, superseding 1031A, on type AW resistor arc welders; GEA-1254 on Textolite molded control pulleys for aircraft; and GEA-1326 on totally enclosed, fan-cooled induction motors, type K.

HEATING MACHINES AND QUENCHING TANKS. The American Gas Furnace Co., Elizabeth, N. J., has published bulletin 8A on heating machines of chain belt and conveyor types, reciprocating hearth types, pusher types, rotary retort types, friction conveyor types, and rotary retort continuous types, and also automatic and belt-conveyor quenching tanks.

INDEX OF ECONOMIC REPORTS. The Metropolitan Life Insurance Co., Policyholders Service Bureau, 1 Madison Ave., New York, N. Y., has issued an "Index of Economic Reports," revised as of October 1, 1930. It indexes more than 400 articles and reports on problems of management published by the company.

PUMPS. The Geo. D. Roper Corporation, Rockford, Ill., is distributing catalog No. 58 on rotary pumps. This 104-page book covers rotary pumps for hydraulic service, transfer of power, and for circulating coolants. Each type is illustrated and described and specifications are listed. An appendix of tables and engineering information on pumps is provided.

THREADING MACHINES. The Landis Machine Co. Inc., Waynesboro, Pa., now has available bulletin No. E-70 on ¾- and 1-in. automatic forming and threading machines. The bulletin shows the construction, cam cycle, and the various units for these machines, together with the specifications.

UNIT HEATERS. The Buffalo Forge Co., Buffalo, N. Y., has issued catalog No. 469 discussing Highboy and Lowboy units, Wetboy Units, Model "B" Breezo-fin heaters, and gas unit heaters.

YEARBOOK OF RAILROAD INFORMATION. The Committee on Public Relations of the Eastern Railroads, 143 Liberty St., New York, N. Y., has published "A Yearbook of Railroad Information" — 1930 Edition. It shows what has been done in recent years towards solving the railroad problems from the viewpoint of the shipping and traveling public, the railway employees, and the investors in railway securities and provides many tables and statistical studies.

NEWS OF THE WEEK

51st Annual A.S.M.E. Meeting Has Record Attendance

A TOTAL of 2,605 were registered for the annual meeting of the American Society of Mechanical Engineers, in the Engineering Societies Bldg., New York, N. Y., throughout last week, surpassing any previous registration for an annual meeting. Technical sessions were crowded, discussion unusually active, excursions popular, and social events also exceptionally well attended. The exhibition of art by engineers, which opened on the first night, was crowded throughout the days of the meeting.

The Melville awards were conferred at Monday night's session to Herman Diederichs, director of the Sibley School of Mechanical Engineering, Cornell University, and William D. Pomeroy, Vice-President and General Manager of Goulds Pumps, Inc., for their paper on "The Occurrence and Elimination of Surge or Oscillating Pressures in Discharge Lines from Reciprocating Pumps."

The junior award for 1930 went to Ed Sinclair Smith, Jr., of the Builders Iron Foundry, for his paper on "Quantity-Rate Fluid Meters."

President's night was well attended. Paul Doty presided and introduced the new president, Roy V. Wright, after which honorary membership was bestowed upon Dr. Elihu Thompson. Addresses of the evening by Ralph E. Flanders and Dr. Wesley C. Mitchell were significant in denoting the widening interests of the engineer and the broadening of his scope beyond the mere design and building of labor-saving machinery. Mr. Flanders pointed out that the replacing of human toil by machines was not responsible for unemployment, but the fact that management had not devised proper methods of so distributing the increased production that it could be placed in the hands of those who needed it. Dr. Mitchell outlined the intricacies of business, credit, banking, and other factors, stressing the inertia of the human mind that made changes difficult even when they promised improvements in methods. Both referred to the Soviet experiment as an attempt to find a solution.

The importance of the subject is evidenced by a session Dec. 3 on "Stabilization of Employment," at which Ralph E. Flanders presided. There were three papers, "Manufacturing in Advance of Orders," by Edwin S. Smith; "Employment Stabilization in the Procter & Gamble Plant," by Harvey C. Knowles; and a discussion on "Causes, Palliation, and Prevention of Unemployment," by Dr. Royal Meeker. Mr. Smith told of methods to reduce seasonal slumps. "Efforts to reduce 'seasonality' may take the form of striving for a more uniform sales demand throughout the year, an attempt to get orders further in advance of the season, a more level production curve, or all three," he said.

A guaranteed employment plan put into effect in 1922 by the Procter & Gamble Co., of Ivorydale, O., under which not one of the 10,000 employees of the plant were laid off in the last twelve months, despite a 10 to 15 per cent reduction in business, was described by Mr. Knowles, who is general superintendent there. The Procter & Gamble plan guarantees 48 full working weeks a year and includes sick benefits and the purchase of stock by employes. The latter has been a company policy for many years. A feature was the budgeting of sales which has been kept approximately to schedule even during the present depression. Discussion as to the possibility of applying to other industries was spirited and lengthy. Dr. Meeker suggested three major policies which may be inagurated at once:

1—Planning production to meet the estimated requirements of consumption.

2—Stabilizing the general price level, that is, the buying power of money.

3—Providing carefully planned all-inclusive employment insurance to prevent unemployment, as well as to care for the unemployed.

Among those discussing the whole problem were John M. Carmody, Dr. Lillian M. Gilbreth, and R. E. W. Harrison.

At the annual dinner a successful innovation was the inclusion of the ladies at the main tables. Vice-President Lauer gave the charge to new members, which included two women. Ely C. Hutchinson was toastmaster and President-Elect Wright made a few appropriate remarks. Fifty-year badges were presented to 14 founder members, Ambrose Swasey and Henry Marx being among those present to receive them in person. Bancroft Gherardi presented Admiral David Watson Taylor with the John Fritz medal for 1931 after Capt. Walter M. McFarland had outlined the many achievements of the recipient. In a most timely and forceful address Prof. Elliott Dunlap Smith of Yale, under the title of "Engineering Encounters Human Nature," pointed out two examples of engineering and management in the textile industry, had handled the problem of mechanizing the industry. Adherence to the old method caused a whole town of native born, religiously inclined citizens of the South to become outraged at the results, to organize their own union and strike in the face of almost certain starvation. Another similar mill, intelligently managed, increased production, wages and profits.

ELLIOTT DUNLAP SMITH

Professor Smith in his address made a plea to the engineering profession "to see beyond the mechanism created by the engineer to its effect on human nature."

"The engineer has a duty," he said, "to join with the economist and the sociologist, the business man and the manager in seeing that the new instrument he has created and that is remolding the world is wholesomely employed. As the problems of society grow more technical the need and the opportunity for engineers to share in the solving of the social problems through participation in government and social and civic movements also grows greater."

"American Management in Europe," by Wallace Clark, outlined his experiences in nine European countries and contained a number of observations of value to those who contemplate foreign trade or manufacture abroad. His observations were supplemented by the experience of James D. Mooney, who presided. Considerable discussion followed, in which the Soviet experiment was referred to by Harrington Emerson, Wallace Clark, and others.

The annual Exposition of Power and Mechanical Engineering, held at the Grand Central Palace during the week, was crowded throughout the period, and exhibitors expressed the opinion that the record crowd of 125,000 who attended last year had been surpassed. The instruments and processes shown by the exposition's 400 exhibitors included almost everything related to power and production machinery.

Unemployment Legislation Floods Congress

Paul Wooton
Washington Correspondent

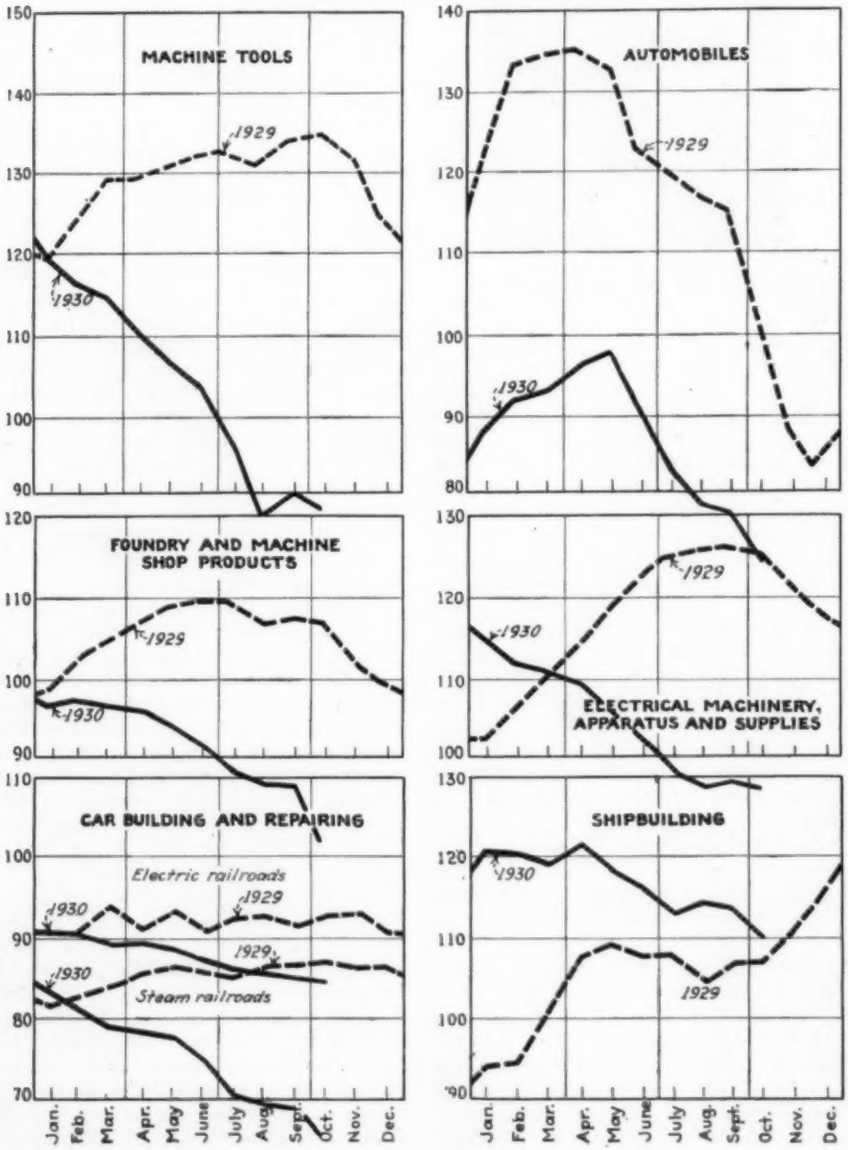
WASHINGTON, D. C., Dec. 9—At the falling of the gavels that officially opened the new session of Congress on Dec. 1, Senators and Representatives who had been girding themselves to enter the fray against unemployment and the business depression began to burst forth with relief proposals. It is now open season for legislation of this type. Competition in saving the country from economic evils is likely to be keen. Happily for business, this very competition will bring about a situation whereby rival bills will tend to block one another, with the result that the country will be spared the well-meaning, but disturbing, efforts of the legislators.

The flood of relief legislation has only begun to flow. There will be bills to collect regular statistics on unemployment, bills to institute a series of employment agencies under the federal government, bills to expedite public construction, and in all probability bills to secure direct payments to persons in distress. Unemployment bills already are before Congress, introduced last session by Senator Wagner of New York. One of these bills sets up machinery for the advance planning of public works, another provides for the regular enumeration of the unemployed. A third authorizes the establishment of a national system of federal employment agencies.

Trend of Employment In the Metal-Working Industries

Data Supplied by the Bureau of Labor Statistics

Monthly average for 1926 = 100



After satisfying itself that no country in the world, with the exception of Soviet Russia, exports to the United States any goods made by convict labor, the Treasury Department issued new revised regulations under the new tariff law permitting it, without affirmative proof, to exclude goods suspected of convict labor origin.

Effective immediately, the regulations provide that after a finding by the Commissioner of Customs that convict labor is used in any locality in a foreign country in mining, producing, or manufacturing any class of merchandise, importation of any merchandise of that class from that locality shall henceforth be prohibited. The importer is required either to put up cash or file a bond (by a surety company on the Treasury Department's approved list) equivalent to the domestic value of the cargo for its return to customs custody if the Commissioner of Customs decides that convict labor was employed at any stage.

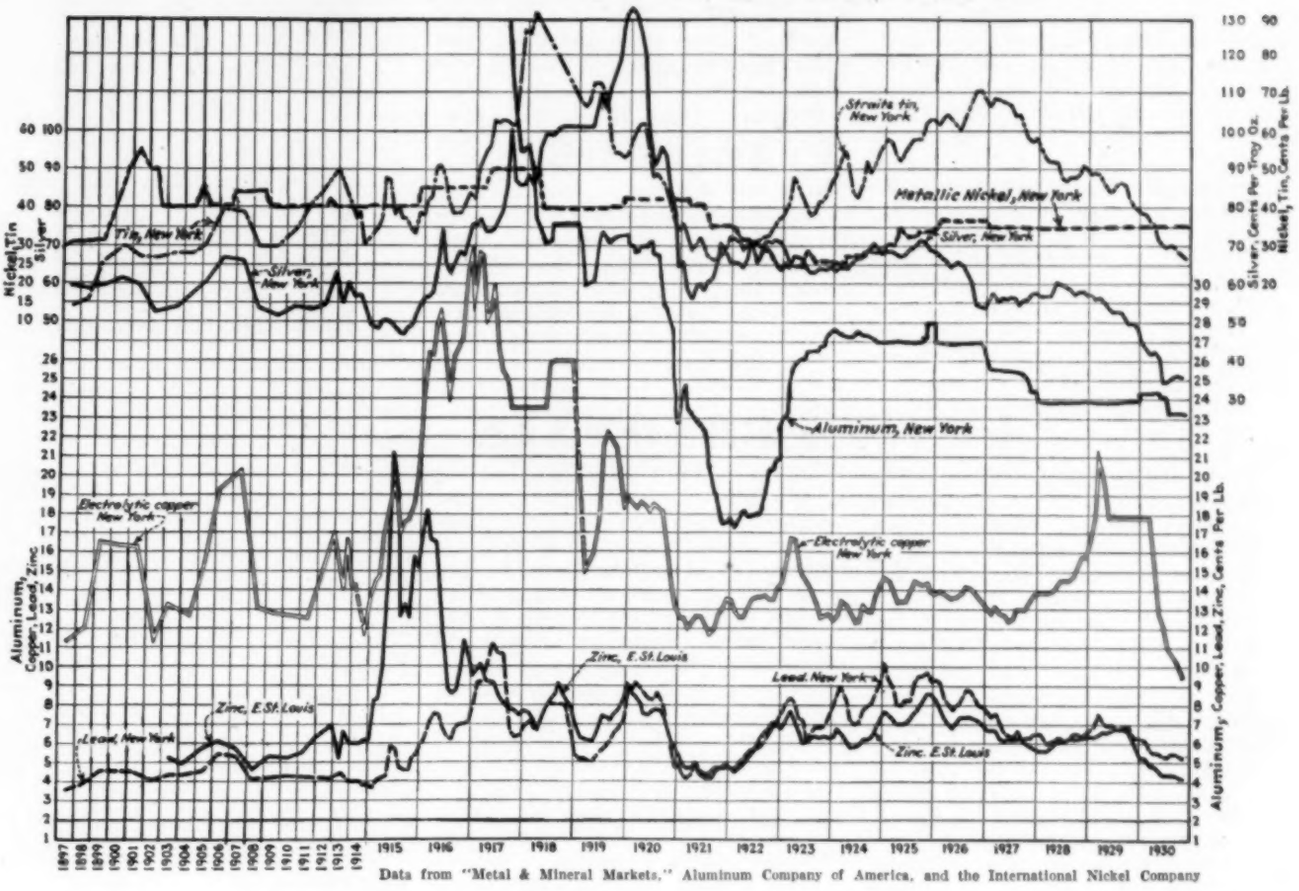
The regulations are even more drastic than appears on their face and the belief is expressed in official quarters that they have sealed the doom of Soviet trade in the United States.

One of the largest ball-bearing companies in Italy will erect for the Soviets in Moscow a completely modern and efficient plant, designed to double past output, according to information contained in a report from Consul William W. Heard, Turin, made public by the Department of Commerce. The agreement provides for the training of the necessary technicians in the local plant, while from private sources it is understood that a number of Soviet technicians are already at work in the Turin plant of the Italian company.

Limit Gage Committee Personnel Announced

The membership of the new committee formed to study revision of recommendations made five years ago regarding cylindrical fits of metal parts includes: Edward J. Kearney, Chairman, C. E. Rundorff, Secretary, and Prof. Earle Buckingham, Fred H. Colvin, Eugene C. Peck, Henry C. E. Meyer, Wm. C. Schoenfeldt, T. E. Stevens, Evans Ward, John Bath, Elmer J. Bryant, Luther D. Burlingame, Frank O. Hoagland, C. S. Messler, Oliver B. Zimmerman, Chas. F. Reiman, H. E. Brunner, David W. Oviatt, T. F. Rogan, Henry W. Bearce, G. E. Hammann, Col. J. O. Johnson, and a number of alternates. New members will be added from time to time.

Trends in Non-Ferrous Metal Prices, 1897-1930


Straits tin, New York
Metallic Nickel, New York
Tin, New York
Silver, New York
Silver, New York
Aluminum, New York
Electrolytic copper New York
Electrolytic copper New York
Zinc, E. St. Louis
Lead, New York
Lead, New York
Zinc, E. St. Louis
Zinc, E. St. Louis
Nickel, Tin, Silver
Silver, Cents Per Troy Oz.
Nickel, Tin, Cents Per Lb.
Aluminum, Copper, Lead, Zinc
Aluminum, Copper, Lead, Zinc, Cents Per Lb.
1897 1898 1899 1900 1901 1902 1903 1904 1905 1906 1907 1908 1909 1910 1911 1912 1913 1914 1915 1916 1917 1918 1919 1920 1921 1922 1923 1924 1925 1926 1927 1928 1929 1930

Data from "Metal & Mineral Markets," Aluminum Company of America, and the International Nickel Company

A.S.A. Forms Light Metals Group

The formation of a Light Metals Group, with the Aluminum Co. of America as the first member, is announced by the A.S.A. This group becomes the forty-fifth member-body of the Association, with representation on the A.S.A. Standards Council. It is expected that the creation of the Light Metals Group will stimulate the establishment of national standards.

A new project for the establishment of American Standards for basic requirements of gas appliances has just been announced by the A.S.A. The project will be placed in the hands of a technical committee under A.S.A. procedure, at the request of the American Gas Association which will direct the technical work of the committee. The agreed-upon scope of the work is "establishment of minimum or basic requirements for performance, safe operation, and substantial and durable construction for domestic gas burning appliances; together with laboratory methods of test for determining compliance therewith."

BUSINESS ITEMS

The General Electric Co. has decided to begin its unemployment plan as of Dec. 1. The original rules provided that no payment should be made for at least six months after inauguration, but the change was decided upon because of the present situation. On Dec. 1, employees had paid in $350,000 to the fund, and this fund, matched dollar for dollar by company funds, will be paid out at a maximum of $15 per week to employes needing assistance.

The Stanley Works, New Britain, Conn., has purchased the building at 100 Lafayette St., New York City, where its New York office and warehouse stocks are located.

Construction of another of the units of the Consolidated Steel Corporation's plant at Los Angeles, Calif., is to be started on the extensive site of this firm at Eastern & Slauson Aves. This section is to be devoted to structural steel and tank work, and will be of sawtooth type covering an area of some 200x600 ft.

A subsidiary company to be known as Alco Products, Inc., has been formed by the American Locomotive Co., New York City. The subsidiary will design and construct process plants and equipment for oil refineries and will acquire and continue the business of Heat Transfer Products, Inc., formed by the parent company two years ago. The American Locomotive plant at Dunkirk, N. Y., will be used for manufacturing. William H. Woodin is chairman of the executive committee of the new company; William C. Dickerman, chairman of the board; Joseph Davis, president, and H. R. Swanson and G. T. Jacocks, vice-presidents; F. P. Brent is controller; J. O. Hobby, Jr., treasurer; and J. D. Finn, secretary.

The Clark Electric Water Heater Division of the McGraw Electric Co., 5201 W. 65th St., Chicago, Ill., has moved its general sales offices formerly located at Omaha, Nebraska, to that address, effective Nov. 17.

The Clinton Machinery Co., 128 South Clinton St., Chicago, recently added a floor of space to its quarters.

The C. A. Dunham Co., Ltd., Toronto, has started the manufacture of Dwyer unit heaters. These heaters have been manufactured in the United States for the past twelve years. Manufacture in Canada followed the purchase of the Dwyer Equipment Co., Chicago, by the C. A. Dunham Co.

The Gas Equipment Division, including the foundry, of the Columbus Heating & Ventilating Co., Columbus, Ohio, has been purchased by The Surface Combustion Co., Toledo, Ohio, according to a recent announcement by Frank H. Adams, General Manager of Surface Combustion. For the present, ac-

tivities of the Columbus company will be maintained in the Columbus plant, but all sales activities will be consolidated with those of Surface Combustion. Surface Combustion also took over the Chapman-Stein Co., Mt. Vernon, Ohio, about a year ago and the Webster Engineering Co., Tulsa, Okla., about two years ago.

The Genfire Steel Co. has been incorporated with the Truscon Steel Co., and will function as its dealer and commodity division, under the direction of W. B. Turner, formerly manager of Genfire Steel. The sales organization of Genfire is being kept intact and merged with the Truscon sales organization.

"Barsonator" Werkzeug G.M.B.H., Kurze Reihe 40-43, Hamburg-Wandsbek, Germany, is planning a special department dealing solely with American machines and tools. Sufficient store and show-rooms in the company's own building are available and the company desires sole sale for Germany or for the whole Europe. The company has agents in all leading industrial towns and also agents in every European country.

The Hamilton Metalplane Co., Milwaukee, Wis., affiliated with United Aircraft & Transport Co., has announced discontinuance of the manufacture of the Hamilton metal plane except on special orders. Charles F. Barndt will resign as general manager and James G. Cowling, Jr., chief engineer, has been placed in charge. A service and parts depot for Hamilton planes and metal propeller service will be maintained at the airport hangar shop, by the Hamilton Co., a division of the Boeing Airplane Co., Seattle, Wash.

Plans for a new and enlarged plant recently were announced by the Hammer-Bray Co., Oakland, Calif. The present plant, located at Twenty-sixth Ave. & East Twelfth St., is to be sold, it is reported, and the new factory erected on One Hundred Second Ave.

Cav. Uff. Ing. Piero Alajmo, Piazza Duomo, 21, Milano, Italy, Italian distributors of American made machinery and tools, is hunting additional American factories to represent.

L. R. Botsai
Now Gearing Apparatus Manager
Westinghouse Nuttall Works

Cutler-Hammer, Inc., Milwaukee, has received an order for lifting magnets from the Illinois Steel Co., Chicago, valued at more than $300,000. The order includes eight 65-in. and one 55-in. magnets.

Directors of the Hayes Body Corporation, Detroit, have approved a plan for the acquisition of the Central Ohio Steel Products Co.

The Millholland Sales & Engineering Co., 1833 Ludlow St., Indianapolis, Ind., has adopted the 8-hour day, 48-hour week. The plant is now operating two shifts a day and 6 days a week and expects to continue double-shift operation through the first quarter of 1931.

PERSONALS

T. Amori, Professor of Engineering at the College of Port Arthur, and Doctor M. Ishikawa, Professor of Engineering at the College of Tokyo, are returning to Japan from Europe by way of the United States, and are spending a month in this country inspecting some of the leading manufacturing units and engineering schools.

Walter J. Bauer, Superintendent of the Remington Noiseless Typewriter Co., Middletown, Conn., resigned effective Dec. 1, and George K. Howland, Manufacturing Superintendent, has been appointed to succeed him. Mr. Bauer, who had been with the company since 1916, had been in ill health.

Fred A. Benz, chief executive of the Benz Engineering Corporation, Salamanca, N. Y., has been elected mayor of that city, to succeed Bert L. Hunt, who died recently. Mr. Benz was chosen by the city council at the request of leading business men of the city. He will hold office until Jan. 1, 1932.

C. E. Brodhead became affiliated with the bolt and nut department of the Bethlehem Steel Corporation, New York, on Nov. 1. He was at one time vice-president of the Scranton Bolt & Nut Co., becoming New York and New England sales manager when the Scranton company was merged into the Wrought Iron Co. of America.

D. C. Jackson, Jr., has resigned as head of the department of mechanical and electrical engineering at the Speed Scientific School, University of Louisville, to assume the duties of head of the department of electrical engineering, University of Kansas, Lawrence.

Benjamin H. Gilpin, Service Manager of the Pratt & Whitney Aircraft Co., Hartford, Conn., has been appointed factory manager, according to an announcement by Don L. Brown, recently elected president. T. E. Tillinghast, Executive Engineer, has been elected a director and will have charge of all outside engineering activities under A. V. D. Willgoos, Chief Engineer. Mr. Willgoos will also be assisted by L. S. Hobbs, Research Engineer, and Earl A. Ryder, Assistant to the Chief Engineer.

C. W. H. Himes
Now Manager, Engineering Dept.
Westinghouse Nuttall Works

Gilbert Follansbee, general manager at the Toronto, Ohio, plant of the Follansbee Bros. Co., Pittsburgh, has been made general manager of the Follansbee (W. Va.) plant of the company also. All plant offices are being moved to the West Virginia plant.

H. J. Freyn, President of the Freyn Engineering Co., Chicago, returned to this country on Nov. 19 after several months in England and the U.S.S.R.

J. E. Hart has been appointed Boston works manager for the Walworth Co., First & O St., South Boston, Mass. J. Frank Dorney has been appointed assistant to the works manager, and Chester L. Erickson has been appointed superintendent of production.

Felix Hurwitz has been made office manager of the Reinforcing Bar Department, Igoe Brothers, Newark, N. J. He has been connected with the sales force of the company and succeeds R. H. Grubb, who has joined the engineering department.

Paul Llewellyn, formerly president of the Interstate Iron & Steel Co., Chicago, has been elected chairman of the board of the reorganized Empire Steel Corporation, Mansfield, Ohio. He had been president of the Interstate company since 1925, having previously been vice-president in charge of sales. George M. Smith is general superintendent, Stanley A. Richardson chief metallurgist, Frank B. Handy assistant secretary, Burton L. Verner purchasing agent, and Albert Mainack open-hearth superintendent. All were formerly located with Interstate at Chicago, and all are now at the Empire general offices in Mansfield.

Ralph S. MacPherran, chief chemist of the Allis-Chalmers Manufacturing Co., Milwaukee, an outstanding metallurgist in the gray iron foundry field, has been awarded the J. H. Whiting gold medal of the American Foundrymen's Association for his many valuable contributions to the foundry industry.

W. D. Moore, President of the American Cast Iron Pipe Co., Birmingham, Ala., is chairman of the general committee on arrangements and preparations for the Southern regional meeting of the American Foundrymen's Associa-

tion, to be held with the Birmingham foundrymen and allied industries cooperating on Jan. 20-21, 1931. The first day will be given over to plant visitation and the second to reading and discussion of papers on trade matters. An attendance of 400 or 500 is expected.

A. W. D. Mullins, Chief Mechanic of the Guinea Airways, Ltd., has been visiting various aircraft and engine manufactories in the United States. He will also go to Germany and England to visit aircraft and aircraft engine manufacturers before returning to New Guinea.

Owen K. Parmiter, metallurgical engineer of the Firth Sterling Steel Co., McKeesport, Pa., spoke on "Super High-Speed Steels" at the Dec. 9 meeting of the Hartford (Conn.) Chapter of the American Society for Steel Treating.

Henry A. Roemer, President of the Continental Steel Corporation, will become president of the Sharon (Pa.) Steel Hoop Co. as of Jan. 1, to succeed Severn P. Ker, who has been president for the past 21 years, and who will remain the chief officer of the company as chairman of the board of directors and of the executive committee.

J. Q. H. Smith has been elected executive vice-president of the Wrought Iron Co. of America, with offices in the Commercial Trust Bldg., 15th & Market Sts., Philadelphia. He was formerly president of the Virginia Iron Works.

R. W. Thompson has been appointed director of public relations for the Reading (Pa.) Iron Co., in addition to his duties as advertising manager, manager of cut nail sales, and manager of sales for the Stoyestown (Pa.) coal mine, operated by the Reading Co.

T. I. Phillips
Now Works Manager
Westinghouse Nuttall Works

H. J. Allen, formerly superintendent of the Bourne-Fuller Company's plant at Cleveland, has been appointed superintendent of the Mystic Iron Works, Everett, Mass., to succeed H. J. Briney.

Arthur J. Tuscany, Manager of the Gray Iron Institute, addressed the regular meeting of the Philadelphia Foundrymen's Association on Dec. 10 on "Progress in the Gray Iron Industry."

John H. Miller, formerly connected with the General Steel Castings Co., Eddystone, Pa., has resigned. Mr. Miller was formerly in the engineering department of American Steel Foundries, Alliance, Ohio.

OBITUARIES

James G. Dornbirer, 63, founder of the Cleveland (Ohio) Planer Co., died on Nov. 27 at his home there after a long illness. Mr. Dornbirer invented the open-side steel planer and organized his own company in Cleveland 35 years ago. He retired 12 years ago and later became honorary president of the Dornbirer Machine Tool Co., Cleveland.

George R. Elder, 68, who retired recently as vice-president of the Ingersoll-Rand Co. of New York, died on Nov. 29 at his home in Waterford, N. Y.

Isaac W. Frank, 75, formerly secretary and engineer of the Lewis Foundry & Machine Co., Pittsburgh, and organizer of the Frank-Kneeland Machine Co., which later became one of the units of the United Engineering & Foundry Co., died on Dec. 1 at his home in Pittsburgh.

Edwin F. Kitselman, 60, Vice-President of the Muncie Oil & Engine Co., and secretary of Kitselman Brothers, Muncie, Ind., died in Rochester, Minn., recently.

Charles T. Leffler, President of the Leffler Machinery & Die Co., Inc., 73 Clymer St., Brooklyn, N. Y., died at his home in that city recently. He had been in the machinery business for more than a half century.

Anker S. Lyhne, 65, President of the Bridgeport (Conn.) Metal Goods Co., died on Nov. 28. In 1891, Mr. Lyhne went to work for Sargent & Co., New Haven. In 1901, he joined the New Britain Hardware Manufacturing Co., and later came to the Bridgeport Brass Co. as assistant superintendent. In 1909, with Herman K. Beach, he organized the Bridgeport Metal Goods Co.

Thomas A. Mackenzie, 64, son of Duncan Mackenzie, founder of the Mackenzie Iron Foundry, Trenton, N. J., and himself prominently identified with the Mackenzie enterprises for many years, died on Nov. 26 at his home in Trenton. He was also an official of the Trenton Steel & Wire Co. and the Union Electric Co.

David E. Miles, 61, General Manager of the No. 3 plant of the Moline (Ill.) Iron Works, died recently of heart disease.

A. B. Neumann, 60, a member of the engineering staff of the Freyn Engineering Co., Chicago, died on Nov. 27 at Dusseldorf, Germany. Mr. Neumann was internationally known as an engineer and designer of steel plants.

Nathan W. Perkins, 71, a mechanical engineer, for many years with the Ellis Adding Machine Co., Newark, N. J., died on Dec. 1 at his home in East Orange, N. J. He was also at one time with the National Cash Register Co.

Michael J. White, Treasurer of the United States Hoffman Machinery Corporation, New York City, died at his home in Brooklyn, N. Y., on Nov. 25. He had served with the company for the past 15 years.

FORTHCOMING MEETINGS

American Standards Association—Annual meeting, Dec. 11, Engineering Societies Bldg., New York City. P. G. Agnew, 29 West 39th St., New York, secretary.

American Management Ass'n—Shop Methods Conference at William Penn Hotel, Pittsburgh, Pa., from Dec. 11-12. Headquarters, 20 Vesey St., New York, N. Y.

Society of Automotive Engineers—Annual meeting, Detroit, Jan. 19-23, 1931. John A. C. Warner, 29 West 39th St., New York, secretary.

Fifth Midwestern Power & Engineering Conference and Exposition—Chicago, Feb. 10-14, 1931. G. E. Pfisterer, 53 West Jackson Blvd., Chicago, secretary.

Western Metal Congress and Exposition—Second National, Civic Auditorium, San Francisco, Calif., Feb. 16-20, 1931. Under auspices of A.S.S.T. W. H. Eisenman, secretary, 7016 Euclid Ave., Cleveland, Ohio.

Three-M-Congress — Management, Maintenance, and Materials Handling Congress and Second National Industrial Equipment Exposition, Cleveland, Ohio, April 13-18, 1931. In the Arena and Exhibit Hall, Cleveland Public Auditorium. Information from the A.S.M.E., 29 West 39th St., New York City.

American Society of Mechanical Engineers—Calvin W. Rice, executive secretary, Engineering Societies Bldg., 29 West 39th St., New York, N. Y. The following meetings are scheduled:

Semi-Annual meeting, Birmingham, Ala., Apr. 20-23, 1931.

National Materials Handling Meeting and Management congress, Cleveland, Ohio, Apr., 1931.

National Aeronautic Meeting, Baltimore, Md., May, 1931.

American Foundrymen's Association—Annual convention and exhibition, Stevens Hotel, Chicago, May 4-8, 1931, C. E. Hoyt, 222 West Adams St., Chicago, secretary.

American Gear Manufacturers' Association—Annual Spring Meeting, Hotel Statler, Buffalo, May 7-9, 1931. T. W. Owen, 3608 Euclid Ave., Cleveland, secretary.

THE INDUSTRIAL REVIEW

Weekly progress of the machinery and machine tool business

NEW YORK

Inquiries constitute the redeeming feature of current business, even though dealers realize that inquiries alone can do little towards making Santa's visit a reality. The small lists of the week previous caused no flurry of hopes, since dealers recognized them as exceptions. All machines of the A.C.F. order were for Detroit. There is some promise of orders immediately after the first, but the pickup is dependent upon betterment of general business conditions. Meanwhile, progressive dealers are making valuable contacts and getting single orders here and there to help pay the help.

The New York Central Railroad is inquiring for 170,000 tons of 105,115, and 127-lb. Dudley rails for 1931, as compared with 206,000 tons last year. Westinghouse plans changes at its South Philadelphia Works to cost $300,000, to affect the locomotive equipping and testing shop.

NEW ENGLAND

Machine tool expectations for December run low. Improvement is apparently not in the cards. Traditionally, December is the readjustment period, and distribution of machine tools will remain a matter of one or two tools. Developments in other industries revive hopes that the rock-bottom base of depression is behind.

The brass and pig iron industries booked good orders. The American Brass Co., received its largest order of the year, a matter of three months' work. The Mystic Iron Works, Everett, Mass., has a 30,000-ton pig iron order from the American Radiator Co. The Lapointe Machine Tool Co., Hudson, Mass., will be occupied with a new order from Russia for 6 or 7 weeks.

The New Departure Co. has resumed a five-day schedule. Brake lining orders have stepped up schedules at the Russell Manufacturing Co. The Firestone Footwear Co. has increased to five-day schedules in some departments.

DETROIT

The machinery and machine tool trade in the Detroit district is now in the midst of a seasonal depression, more serious this year than in other years, of course, by reason of the long period of dullness in the automotive industry. Only a few scattered orders are coming in and even those dealers whose business is above the general level have reported that the market is extremely spotty. One large auto builder has made a numebr of recent purchases.

Prospects for an early advance in the coming year seem to be good, although dealers agree that their estimates are not based on anything more definite than general tendencies in the automobile industry. New models brought out recently by automobile manufacturers are receiving favorable attention and there are excellent prospects that the industry will go forward steadily. Employment is increasing and the general atmosphere is improving.

SAN FRANCISCO

Roadmaking and construction equipment machinery are still in the lead in this territory. One of the oldest firms in San Francisco reports that although November sales have fallen slightly below those of October, a banner month in its history, the year as a whole has exceeded 1929. Credit for this result is attributed largely to small sales. Woodworking machinery and machine tools remain at low ebb, although one firm in particular reports October equal to the combined business of July, August, and September, with November sales slightly below those of October. Equipment recently supplied includes a large filtering press used in the manufacture of dry colors, six metal working machines, a belt cutter, a radial drill, and a heavy woodworking machine.

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STRAIGHT LINES on sales graphs indicate the trend of current business, no advances being reported, nor no real decline beyond the usual December falling off. There is an occasional order for several units, but general sales are for single items needed at once for replacement, with the exception of the increasing flood of Christmas orders being received from dealers' wives. Inquiries remain encouraging, and are one of the factors contributing a certain amount of optimism and buoyancy to the situation, though expectations are placed beyond the opening of 1931.

NEW YORK had a steady week, with no lists in sight. New England lists some improvements in industries which may reflect upon machine tool purchases, and announces a 6-week Soviet order for Lapointe. Detroit has only scattered orders, good prospects, and purchases by one automobile builder. San Francisco reports good sales for one exceptional company, but machine tools sales in general, slow. Cincinnati dealers and manufacturers have the year's sales apple eaten almost to the core, but expect inquiries to become orders after New Year's.

CHICAGO district railroads are showing some interest, one buying a $6,000 engine lathe. Used tool dealers there have made but few sales, and the International Harvester list has been shelved. Canadian demand is for waterpower plants, foundries and locomotive builders being slow. Allis-Chalmers has taken a contract for six waterwheels; iron and steel production is up. Southern District December business appears promising, the general opinion being that the low point has been passed, an opinion shared by the other districts.

CINCINNATI

Business booked by machine-tool manufacturers during the last week was indicated by a straight line on the sales graph, showing they were holding their own in a dull general market. Sales agents find this year's sales apple is eaten almost to the core and do not expect much improvement until buying against next year's budgets begins. In the main, the week's sales were to general machinists and miscellaneous users, whose requirements were single tools. A fair volume of inquiries were received. Here and there the requirements were two or three tools, but in most cases they were confined to a single item. The ratio of sales to inquiries is small, but it is hoped that this condition will improve after the first of the year.

CHICAGO

Conditions continue on about the same level as for the last several months, buying being limited to actual necessities. Inquiries drift in, but after receipt of quotations those inquiring appear to take no further interest in correspondence. Within the last week three railroads have shown some interest. Of these one road is reported to have closed for the purchase of an engine lathe to cost $6,000. Nothing further has been heard regarding a list of shop requirements reported about a month ago to have been in preparation by the International Harvester Co., and nothing definite is expected from this source until early in 1931. Dealers in used tools view the present situation without optimism, claiming that though prices have been cut to the lowest margin, goods still remain in their warehouses. The belief generally is expressed that there will be an improvement in the machinery trade after inventories have been disposed of and it is definitely known by industrialists just what expenditures for new equipment are warranted.

CANADA

Inquiries for machine tools are fairly encouraging and portend a stepping up of production after the turn of the year, but present stock is moving out slowly. Car and locomotive plants continue on a part-time basis and foundries are not overly busy. On the other hand, the demand for heavy water power equipment and machinery continues apace, with every prospect of an even better market during the next six months. A contract for five 66,000-hp. waterwheels for the new Abitibi Canyon development has just been awarded to the Allis-Chalmers Co., and tenders are now being called on five big generators for the same development.

Reflecting the improved situation in the iron and steel industry, production of steel ingots and castings during October amounted to 65,431 tons, as compared with 55,808 tons in September. This marked the first upturn in the seven months, since the record for this year was established in March at 117,487 tons. Automobile production in October, at 4,541 cars, was the lowest of the year to date. Inquiries are being made by the Canadian National Railways for materials for the construction of 500 refrigerator cars, 250 of which will be built in each of the company's own shops at London, Ont., and Transcona, Manitoba.

SOUTHERN DISTRICT

With less than a month before the end of 1930, leaders in the machinery and machine-tool industry of this district are already looking toward 1931 and a better business year. There is relatively little indication that the coming year will offer a substantial comeback, but members of the trade feel confident that monthly comparisons will offer more encouragement than the comparisons of 1930 with 1929. There is little doubt but that the trade has undergone its most depressed period; at least, this is the viewpoint of people of this district. While December business is not anticipated as good, it has a tendency at this time to appear promising.

Inquiry continues scattered geographically, and sales for the most part are in small lots and of miscellaneous type. Predicated on the expenditure by the state of approximately a quarter of a million dollars within the next few months, general conditions in Louisiana offer the brightest spot of the territory. This is followed by a brighter outlook for the Jackson (Miss.) area. Birmingham and Houston continue quiet with little change reported at New Orleans.

BUSINESS • BAROMETER

Outlook is remarkably tranquil in the face of so many perplexities

THEODORE H. PRICE
Editor, Commerce and Finance, New York

PRESIDENT HOOVER has asked Congress for authority to spend $150,000,000 to relieve the unemployed who are in distress, and at Washington some are advocating the issuance of a billion dollars in government bonds whose proceeds shall be devoted to employing all those who can be put to work in completing the construction of the public improvements that Congress has authorized. Preparations are being made for a football game from which it is hoped to raise a million dollars to be used in obtaining jobs for the jobless, and in Wall Street the bankers and brokers have undertaken to raise $8,000,000 to be similarly used in providing work.

Considered collectively and in connection with the philanthropic activities of many private organizations, the large sum that is already in sight would seem to be a guarantee against any very acute hardship during the winter. Efforts to check the influx of those who say they can get no work at home are already being made in some communities. In New York the Welfare Council reports that of the men and women receiving free food and shelter in the city nearly three in every four are from out of town. No less than 60 per cent of the unattached men in the breadlines are believed to have arrived within the last four weeks. If these figures are accurate it would seem that the largest cities are bearing a disproportionate share of the unemployment burden, and that many who can work if they will are idle at the expense of the organized charity of the urban centers. In England a somewhat similar situation presents itself.

Through the eyes of experienced correspondents more is now to be seen of Russia. The U.S.S.R. is coming to occupy a more prominent place in the news dispatches that come from Russia. The candor permitted those who send these dispatches has led many to believe that the Soviet heads are anxious to convince the western world of the brilliant economic destiny that Russia has ahead of her, and that news that was formerly suppressed is now permitted out of a desire to attract western capital and brains. No one knows whether this is true or not, but it must be admitted that the American public is gradually coming to visualize at least one view of Russia, and that most Americans would like to hear more of the opportunities offered by the immense territory over which the Romanoffs formerly ruled.

These various aspects of a many-sided situation are given in some detail because American business is coming to be highly susceptible to extraneous influences. Intimations that commerce between Russia and America will not be blocked much longer are very welcome to those whose productive capacity exceeds the present consumption of a world whose consuming capacity would be almost infinite if it could be taught to work, to save, and to spend with intelligence. Fear of Russian exports should not obscure the truth that the more she sells the more she can buy.

The letters from Russia that are now being printed in our newspapers would seem to indicate that a surprisingly large number of American engineers are at work in the construction of great industrial plants that are now being built in various parts of European and Asiatic Russia. The story is that Stalin is rushing the work on these plants in the hope that he may soon be able to solve the unemployment problem in that country. If he succeeds and the result is an increased demand for our products the fillip that it will give to trade everywhere will soon be noticeable, and there are many who are now saying that the next revival in trade will come from eastward.

Business in this country is, meanwhile, fairly active. Distributive trade has held up remarkably well, and in some lines it is showing a gain as compared with last year. Department stores say that the "Buy Now" advertising is having its effect upon the minds of Christmas shoppers.

The Carnegie Company has advanced some of its prices for steel by $1.00 a ton. The effect upon the entire industry has been tonic. Congress met last Monday. The President's message received the attention usually given it. It will probably be a week or two before anything of importance happens, and this will bring us so near to Christmas that a policy of procrastination is likely to prevail at least until New Year's.

In the stock market stability at about the present level of values would seem indicated. The weakness shown last week by some seasoned bond issues has puzzled many, and there are some who think that it is due to the fear that Germany will soon ask for a moratorium on her reparations payments. If she does, it will apply only to the transfer of direct reparations payments, and not to the service of other indebtedness, but most financial authorities continue to maintain a waiting attitude toward the financial situation abroad. The outlook meanwhile is remarkably tranquil in the face of so many perplexities, and the return of prosperity does not seem to have been much delayed by the week's happenings.

THE BUSINESS WEEK

December 10, 1930

THE beginning of December shows no significant change in the stagnant business situation, and few indications that any change is in early prospect. . . . One thing only may be said with some assurance, which is that the level at which business activity is running shows no sign of going much lower, probably can't, and probably won't, unless something has happened to the world that statistical yardsticks never had to measure before. . . . Our index still fluctuates around a level 20% below normal, dropping slightly from 80.8% (revised) to 80.3% (preliminary) for the week ending November 29. . . . Industrial activity is still sloping down, as usual, to the year end, but from a low level. . . . General trade, reflected in merchandise carloadings and currency in circulation, is pointed up toward the holiday peak. . . . Commodity prices, supported by special stabilization efforts are steadier, but have not been fully tested as yet. . . . Slow fulfillment of the promise of international co-operative effort to check deflation and rectify financial maladjustments is discouraging, and the prospect of increased taxes and Congressional chaos are holes in the Christmas stocking. . . . But it is nevertheless being gradually filled with hope, as business begins to look forward to the new year more calmly and courageously.

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THE WEEKLY PRICE GUIDE . . . .

Rise and Fall of the Market

THE base price on soft-steel bars, shapes and plates for delivery in 1931, has been advanced 5c. per 100 lb., to $1.65, f.o.b. Pittsburgh mill. Buying was less active this week than last, in all metal products out of warehouse stocks. Rail inquiry furnished the only item of interest in steel; the recent flurry of demand in copper subsided; interest in tin and zinc continued light; and lead sales dwindled to small lots. Actual price changes in non-ferrous materials were confined to declines in copper, zinc, solder and babbitt metal at dealers' warehouses in the principal cities.

(All prices as of Dec. 5, 1930)

IRON AND STEEL

PIG IRON—Per gross ton, f.o.b.:

CINCINNATI:	
No. 2 Southern (Silicon, 1.75@2.25)	$14.69@$15.19
Southern Ohio Foundry (Silicon, 175@2.25)	20.89@ 21.39
NEW YORK:	
Buffalo No. 2 Fdry. (Silicon, 1.75@2.25)	20.41@ 20.91
BIRMINGHAM:	
No. 2 Foundry (Silicon 1.75@2.25)	14.00
PHILADELPHIA:	
Eastern Pa., No. 2x (Silicon, 2.25@2.75)	18.26@ 19.26
Virginia No. 2 (Silicon, 1.75@2.25)	22.29
Basic	17.75@ 18.25
CHICAGO:	
No. 2 Foundry, Northern (Silicon, 1.75@2.25)	17.50
No. 2 Foundry, Southern	17.51
PITTSBURGH: including freight charge, $1.76, from Valley)	
No. 2 Foundry	18.76
Basic	18.76
Bessemer	19.26

IRON MACHINERY CASTINGS—Cost in cents per lb. of 100 flywheels, 6-in. face x 24-in. dia., hub not cored, good quality gray iron, weight 275 lb.:

Detroit	4.00
Cleveland	4.75
Cincinnati	4.45
New York	4 75@5.00
Chicago	4.50@4.75

SHEETS—Quotations are in cents per pound in various cities from warehouse; also the mill base in large lots:

Blue Annealed*	Pittsburgh Mill Base	Chicago	Cleveland	New York
No. 10	1.90@2.00	3.35†	3.00	3.40†
No. 12	1.95@2.05	3.45†	3.10	3.45†
No. 14	2.05@2.15	3.55†	3.20	3.50†
No. 16	2.15@2.25	3.65†	3.30	3.60†
Black				
Nos. 18 to 20	2.15@2.25	3.60†	3.40	3.70
No. 22	2.30@2.40	3.75†	3.55	3.85
No. 24	2.35@2.45	3.80†	3.60	3.90
No. 26	2.45@2.55	3.90†	3.70	4.00
No. 28	2.60@2.70	4.05†	3.85	4.15
Galvanized				
No. 10	2.20@2.30	3.65†	3.50	3.55
Nos. 12 to 14	2.30@2.40	3.75†	3.60	3.65
No. 16	2.40@2.50	3.85†	3.70	3.75
No. 18	2.55@2.65	4.00†	3.85	3.90
No. 20	2.70@2.80	4.15†	4.00	4.05
No. 22	2.75@2.85	4.20†	4.05	4.10
No. 24	2.90@3.00	4.35†	4.20	4.25
No. 26	3.15@3.25	4.60†	4.35	4.50
No. 28	3.40@3.50	4.85†	4.70	4.75

*Light Plates. †400 to 3,999 lb.

WELDED STEEL PIPE—Warehouse discounts are as follows:

	New York Black	New York Galv.	Cleveland Black	Cleveland Galv.	Chicago Black	Chicago Galv.
1 to 3 in. butt..	56.14%	43.6%	53.3%	42.3%	57.3%	44.8%
3½ to 6 in. lap..	52.72%	40.18%	50.8%	37.8%	53.9%	41.4%

WROUGHT-STEEL PIPE LIST

Size, Inches	List Price per Foot	Diameter in Inches—External	Diameter in Inches—Internal	Thickness Inches
1	$0.17	1.315	1.049	.133
1¼	.23	1.66	1.38	.14
1½	.27½	1.9	1.61	.145
2	.37	2.375	2.067	.154
2½	.58½	2.875	2.469	.203
3	.76½	3.5	3.068	.216
3½	.92	4.0	3.548	.226
4	1.09	4.5	4.026	.237
5	1.48	5.563	5.047	.258
6	1.92	6.625	6.065	.28
8	2.50	8.625	8.071	.277

SEAMLESS STEEL TUBING—Following net prices are for seamless mechanical tubing, cold drawn, round, .10 to .30 carbon, at New York warehouse in lots of less than 100 ft. or 100 lb.:

Thickness—Decimal	B.w.g. and Fractions	Outside Diameter in Inches—¼	⅜	½	⅝	1	1⅛	1¼
		Price per Foot						
.035"	20	$0.15	$0.16	$0.17	$0.18	$0.19	$0.21	$0.23
.049"	18	.17	.18	.19	.20	.21	.23	.25
.065"	16	.19	.20	.21	.22	.23	.25	.27
.083"	14	.20	.22	.23	.24	.25	.27	.29
.095"	13	.21	.23	.25	.26	.27	.29	.31
.109"	12	.22	.24	.26	.27	.28	.30	.32
.120" or .125"	11	.23	.25	.27	.28	.29	.31	.33
.134"	10	.24	.26	.28	.29	.30	.32	.34

MISCELLANEOUS—Warehouse base prices in cents per lb.:

	New York	Cleveland	Chicago
Spring steel, light*	4.50	4.65	4.65
Spring steel, heavier	4.00	4.00	4.00
Coppered Bessemer rods	7.00	6.00	6.15
Hoop steel	3.75†	4.00	3.75†
Cold rolled strip steel	4.95	6.00	6.10
Floor plates	4.85†	5.30	5.00†
Cold fin., round or hexagon‡	3.40	3.65	3.35
Cold fin., flat or square‡	3.90	4.15	3.85
Structural shapes	3.10†	3.00	3.00†
Soft steel bars	3.10†	3.00	3.00†
Soft steel bar shapes	3.10†	3.00	3.00†
Soft steel bands	3.40†	3.65	3.20†
Tank plates	3.10†	3.00	3.00†
Bar iron (2.75 at mill)	3.24	3.00	3.00
Drill rod (from list)	60%	55%	50%

*Flat, 3/16-in. thick by ¾-in. wide. †400 to 3,999 lb., ordered and released for shipment at one time. ‡Cold finished steel, shafting and screw stock.

Electric welding wire at New York warehouse—3/32, 8.35c. per lb.; ⅛, 7.85c. per lb.; 5/32 to ½, 7.35c. per lb.

METALS

Warehouse Delivery Prices in Cents Per Lb. for Small Lots:

Copper, electrolytic, New York			12.50
Tin, Straits, pigs, New York			27.75
Lead, pigs, E. St. Louis	4.95	New York	6.00
Zinc, slabs, E. St. Louis	4.07½	New York	5.75

	New York	Cleveland	Chicago
Antimony, slabs	9.50@10.50	10.50	10.75
Copper sheets*	21.75	21.75	21.75
Copper wire*	13.25	13.37½	13.37½
Copper, drawn, round*	20.25	20.25	20.25
Copper tubing*	24.12½	24.12½	24.12½
Brass sheets, high*	18.62½	18.62½	18.62½
Brass tubing, high*	23.50	23.50	23.50
Brass rods, high*	16.87½	16.87½	16.87½
Brass wire, high*	19.12½	19.12½	19.12½

*Mill, base.

SHOP MATERIALS AND SUPPLIES

METALS—Continued

	New York	Cleveland	Chicago
Aluminum ingots, 99%†	24.00@25.00	24.30	23.30
Zinc sheets (casks)	9.75@10.25	11.25	10.36
Solder (½ and ½)	22.25	21.50	20@22

Babbitt metal, delivered in case lots, New York, cents per lb.:

Genuine, highest grade	47.00
Commercial genuine, intermediate grade	34.00
Anti-friction metal, general service	30.00
No. 4 babbitt, f.o.b.	10.00

†F.O.B.

NICKEL AND MONEL METAL—Price in cents per lb., base, f.o.b. Huntington, W. Va.:

	Nickel	Monel Metal
Sheets, full finished	52.00	42.00
Sheets, cold rolled	60.00	50.00
Strip, cold rolled	55.00	45.00
Rods, hot rolled	45.00	35.00
Rods, cold drawn	50.00	40.00
Tubing	75.00*	90.00†
Angles, hot rolled	50.00	40.00
Plates	52.00	42.00

*Seamless. †Welded.

OLD METALS—Dealers' purchasing prices in cents per pound, f.o.b. cars:

	New York	Cleveland	Chicago
Crucible copper	8.25 @8.50	8.50	7.25@ 7.75
Copper, heavy, and wire	7.50 @7.75	8.00	6.75@ 7.25
Copper, light, and bottoms	6.75 @7.00	7.25	6.00@ 6.50
Heavy lead	4.00	4.00	3.00@ 3.50
Tea lead	2.00	2.50	2.00@ 2.50
Brass, heavy, yellow	4.50 @4.75	6.50	4.00@ 4.50
Brass, heavy, red	7.25 @7.50	9.50	6.25@ 6.75
Brass, light	3.50 @3.75	5.50	3.50@ 4.00
No. 1 rod-brass turnings	5.00 @5.25	5.50	4.00@ 4.50
Zinc	2.00	1.50	1.25@ 1.50

TIN PLATES—Charcoal—Bright—Per box:

"AAA" Grade:	New York	Cleveland	Chicago
IC, 14x20	$12.10	$11.95	$11.50
"A" Grade:			
IC, 14x20	9.70	9.90	9.50
Coke Plates—Primes—Per box:			
100-lb., 14x20	6.45	6.10	7.00
Terne Plates—8-lb. Coating—Small lots—Per box:			
IC, 14x20	7.75@8.00	7.00	7.50

MISCELLANEOUS

	New York	Cleveland	Chicago
Cotton waste, white, per lb.	$0.13	$0.16	$0.15
Cotton waste, colored, per lb.	.09½	.12	.10
Wiping cloths, washed, white, per lb.	.14	38.00 per M	.14½
Sal soda, per lb.	.01¾	.02	.02
Roll sulphur, per lb.	.028	.03	.04
Linseed oil, raw, in 1 to 4 bbl. lots, per lb.	.102	.104	.10
Cutting oil, about 25% lard, in 5 gal. cans, per gal.	.65	.60	.60
Machine oil, medium-bodied (55 gal. steel bbl.) per gal.	.33	.36	.24
Belting—Present discounts from list in fair quantities (½ doz. rolls) for leather or rubber:			
Leather—List price, 24c. per lin.ft., per inch of width, for single ply:			
Medium grade	30–10%	30–10%	35%
Med. grade, heavy wgt.	30%	30 –5%	30%
Rubber transmission, 6-in., 6 ply, $1.83 per lin.ft.:			
First grade	60%	50–10%	50%
Second grade	60–5%	60– 5%	50–10%

Comparative Warehouse Prices

New York	Unit	Current Price	Four Weeks Ago	One Year Ago
Soft steel bars	per lb.	$0.031	$0.031	$0.0325
Cold fin. shafting	per lb.	.034	.034	.035
Brass rods	per lb.	.1687½	.1487½	.2125
Solder (½ and ½)	per lb.	.2225	.2275	.3025
Cotton waste, white	per lb.	.13	.13	.13
Disks, aluminum oxide mineral, cloth, No. 1 6-in. dia.	per 100	4.59	4.59	4.59
Lard cutting oil	per gal.	.65	.65	65
Machine oil	per gal.	.33	.33	33
Belting, leather, medium	off list	30–10%	30–10%	30–10%
Machine bolts, up to 1x30 in., full kegs	off list	65%*	65%*	50–10%*

*List prices as of April 1, 1927

MISCELLANEOUS—Continued

	New York	Cleveland	Chicago
Abrasive materials — Standard grade, in sheets 9x11 in., No. 1, per ream of 480 sheets:			
Flint paper*	$6.03	$6.03	$6.03
Emery cloth*	25.87	25.87	25.87
Disks, aluminum oxide mineral, 6 in. dia., No. 1, per 100:			
Paper†	2.61	2.61	2.61
Cloth†	4.59	4.59	4.59
Fire clay, per 100 lb. bag	.90	.75	.75
Coke, prompt furnace, per net ton	Connellsville,		2.40@2.50
Coke, prompt foundry, per net ton	Connellsville,		3.50@4.85
White lead, dry	100 lb. kegs	New York,	13.75
White lead, in oil	100 lb. kegs	New York,	13.75
Red lead, dry	100 lb. kegs	New York,	13.75
Red lead, in oil	100 lb. kegs	New York,	15.25

*Less than 3 reams. †Less than 200.

SHOP SUPPLIES

Discounts from new list dated Apr. 1, 1927, applying on immediate deliveries from warehouse stocks in New York and vicinity:

Machine bolts:	
Up to ¾-in. x 6-in., full kegs, list less	65%
Larger, up to 1 x 30-in., full kegs, list less	65%
Less than full kegs or case lots, add to list	10%
Fitting-up bolts: list less	45%
Lag screws:	
Up to ½-in. x 6-in., list less	65%
Larger, list less	65%
Less than full keg or case lots, add to list	10%
Rivets:	
Structural, round head, full kegs, net	$4.50
Structural, round head, broken kegs, net	6.00
Tank, 7/16-in. dia. and smaller, list less	65%
Nuts:	
Hot pressed, square or hexagonal, blank or tapped:	
Full kegs up to 1-in., incl., list less	65%
Larger, up to 3-in., list less	65%
Less than keg or case lots, add to list	10%
Washers:	
Wrought, full kegs, per 100 lb., list less	$4.00
Wrought, broken kegs, per 100 lb., list less	2.00
Turnbuckles:	
With stub ends, list less	20–10%
Without stub ends, list less	55%
Chain:	
Proof coil, base, per 100 lb., net	$8.50
Cast iron welding flux, per lb., net	.35
Bronzing flux, per lb., net	.50

MACHINE REQUIREMENTS AND INDUSTRIAL CONSTRUCTION

Equipment Wanted

Mass., Boston — Bureau of Supplies & Accounts, Navy Dept., Washington, D. C.—will receive bids until Dec. 16 for machine tools, also until Dec. 19 for additional machine tools, etc. for Navy Yard here.

Opportunities for Future Business

Ala., Mobile—Champion Coated Paper Co., L. Thompson, Hamilton, O., plans the construction of a paper mill in vicinity of Mobile. $1,000,000. Maturity indefinite, also at Hamilton and Canton, O. $150,000 each. Maturity in spring.

Calif., Oakland—Bd. of Education, will soon receive bids for the construction of a high school including vocational shop, etc. Estimated cost $400,000. C. W. McCall, 1404 Franklin St., Archt.

Calif., Los Angeles—Benedict & Co., Inc., plans the construction of a plant for the manufacture of Yukon domestic and commercial refrigeration equipment. Estimated cost $250,000.

Calif., San Francisco — Macdonald & Kahn, Financial Center Bldg., are having plans prepared for the construction of a 2 story garage at Falsom and Main Sts. Estimated cost $300,000. Bliss & Fairweather, Balboa Bldg., Archts. U. S. Post Office Dept., lessee.

Calif., Santa Ana—Pittsburgh Plate Glass Co., Grant Bldg., Pittsburgh, Pa., is having preliminary surveys made for the construction of a sheet glass manufacturing plant here. Stone & Webster Engineering Co., 120 Broadway, New York, Engrs.

Conn., Hartford — Goodrich Silvertown Co., 145 High St., had plans prepared for the construction of a 1 story, 30 x 128 and 50 x 70 ft. service station, at Walnut and High Sts. Estimated cost $40,000. Private plans.

Conn., Hartford—Herrup Corp., 64 Pearl St., postponed construction of a 1 story, 75 x 75 ft. automobile service building on Elm St. Estimated cost $40,000. A. Feinberg, 1127 Main St., Archt. Maturity spring or later.

Conn., Hartford—New England Electric Co., 103 Allyn St., is receiving bids for the construction of a storage and service building at Spring and Church St. Ext. Estimated cost $75,000 to $100,000. Westcott & Mapes, 139 Orange St., New Haven, Archts. Noted Nov. 6.

Ind., Gary—Goodrich Silverton Inc., awarded contract for the construction of a 60 x 100 ft. service station at 701 Adams St. Estimated cost $40,000.

Ind., Gary — Phillips Petroleum Co., will build a machine shop and garage at 728 Colfax Ave. Estimated cost $40,000. Private plans. Work will be done by separate contracts.

Ind., Indianapolis—E. F. Murbarger & Son, 1819 North Meridian St., awarded contract for the construction of a 2 story, 40 x 150 ft. plant and display building. Estimated cost $40,000.

Md., Baltimore—Caroline Foundry Co., 723 South Caroline St., manufacturers of semi-steel and gray iron castings, awarded contract for a 3 story foundry. Estimated cost $50,000. Noted Nov. 20.

Mass., Arlington — Stuart Marshall Realty Co., 825 Beacon St., Newton, awarded contract for the construction of a 1 story addition to service garage at Broadway and Alton St., here. Estimated cost $40,000. Noted Nov. 20.

Mass., Cambridge (Boston P. O.)—Cape & Vineyard Electric Co., P. House, Supt., Main St., Falmouth, subsidiary of Associated Gas & Electric System, 61 Broadway, New York, N. Y. is having preliminary plans prepared for the construction of addition to power plant at Martha's Vineyard. Estimated cost exceed $40,000. Private plans.

Mass., South Boston (Boston P. O.)—Owner c/o W. P. O'Brien, 209 Washington St., Boston, plans the construction of a 2 story factory on Dorchester Ave. Estimated cost $60,000. Architect not selected.

Mich., Detour—Durocher Co., manufacturers of mechanical specialties, **plans** to rebuild machine shop recently destroyed by fire. Estimated cost $25,000.

Mo., St. Louis — American Railway Express Co., 1730 Clark Ave., is having preliminary plans prepared for the construction of a garage at Spruce between 15th and 16th Sts. Estimated cost $150,000.

Neb., Omaha—Union Pacific R.R. Co., 15th and Dodge Sts., awarded contract for the construction of a 2 story passenger station, repair and garage to be used by Union Pacific Bus Transportation Co. G. J. Adamson, Omaha, Ch. Engr.

N. J., Bordentown—Dept. of Institutions & Agencies, State House, Annex, Trenton, plans the construction of an industrial school here. Estimated cost $150,000. Architect not selected.

N. J., Elizabeth—Fischer & Dackerman, 1153 Chestnut St., awarded contract for the construction of a 1 story addition to automobile body plant. Estimated cost $40,000. Noted Nov. 13.

N. J., Newark—New Jersey Bell Telephone Co., 540 Broad St., is having sketches made for the construction of a 6 story garage and warehouse at Loretta Ave. and Fabyan Pl. Estimated cost $250,000. Architect not announced.

N. J., New Brunswick—Owner, c/o H. G. Bach, 63 Schureman St., Archt., is having plans prepared for a 1 story, 63 x 200 ft. garage and repair shop. Estimated cost $100,000.

N. Y., Brooklyn — Forest Trim Mills, 420 Oakland St., removal from present location to leased premises in Long Island City. Company will make minor repairs, by day labor. Woodworking and milling equipment will be required.

N. Y., Brooklyn—H. Goldin, 1539 East 16th St., will build a service garage at 16th Ave. and West 45th St. Estimated cost to exceed $85,000. J. J. Millman, 67 Court St., Archt. Work will be done by day labor and separate contracts. Noted Nov. 20.

N. Y., Brooklyn—Lynkings Realty Co., W. Zorn, Pres., 1366 White Plains Rd., New York, plans the construction of a service garage at New Utrecht and 18th Aves., here. Estimated cost $70,000. F. H. Klie, 250 Park Ave., New York, Archt. Maturity late February, 1931. Noted Nov. 20.

N. Y., Brooklyn — Metwood Holding Corp., postponed construction of a factory at 38th St. and Dahill Rd. $550,000. L. Davidson, 104 West 42nd St., Archt. and Engr. Project in abeyance until May.

N. Y., New York—S. Mayer, 41 East 72nd St., is having preliminary plans prepared for a 7 story, 81 x 102 ft. service garage at 158 East 84th St. Estimated cost to exceed $150,000. C. Schaefer, 332 East 149th St., Archt.

N. Y., New York—Sobol Bros. Holding Corp., 110th St. and 5th Ave., plans the construction of a service station, etc., at West and Canal Sts. Estimated cost to exceed $40,000.

N. Y., New York—Twenty Five Rose St. Corp., c/o L. J. Witkin, 11 West 42nd St., plans the construction of a 3 story service and parking garage at 31 Rose St. Estimated cost to exceed $100,000. Noted July 3.

N. Y., Syracuse—W. H. Bissell, 109 South State St., awarded contract for the construction of a 2 story garage on East Washington St. Estimated cost $40,000. Noted Dec. 4.

N. Y., Syracuse — Syracuse Lighting Co., South Warren St., awarded contract for the construction of a garage on Hiawatha Blvd. Estimated cost $100,000.

O., Cincinnati—Owner, c/o Midland Building Co., Burnet Ave., awarded contract for the construction of a 1 story garage, etc., on McMillan St. Estimated cost $150,000. Noted Dec. 4.

O., Cleveland—The Yoder Co., C. M. Yoder, Pres., 5500 Walworth Ave., manufacturers of overhead door machinery, will soon award contract for the construction of a 1 and 2 story factory at West 55th St. and Walworth Ave. Estimated cost $200,000. W. H. Hatch, 559 Hippodrome Bldg., Archt.

Ore., Portland—Union Pacific R.R. Co., 15th and Dodge Sts., Omaha, Neb., awarded contract for the construction of a 1 story, 100 x 100 ft. garage at Stout and Jefferson Sts. Estimated cost $45,000.

Pa., Greenville—Sterling Oil Co., R. S. Newton, Emlenton, will soon receive bids for the construction of a 1 story service station at Penn and Main Sts. Estimated cost $40,000. H. C. Clepper, 103 Vandergrift Bldg., Pittsburgh, Archt. Noted Sept. 4.

Pa., Johnstown—Bethlehem Steel Co., plans extension and improvements to plant. Estimated cost to exceed $3,000,000. Work will be done by day labor and separate contracts.

Pa., Lewisburg—Treasury Dept., Office of J. A. Wetmore, Supervising Archt., Washington, D. C., will receive bids until Dec. 30 for the construction of a federal penitentiary, including 26 x 124 ft. garage, 62 x 202 ft. factory, 43 x 129 ft. storage building, etc., here. Estimated cost $3,000,000.

Pa., Philadelphia — Philadelphia Gas Works Co., 1401 Arch St., awarded contract for a 1 story, 48 x 158 ft. mechanical shop at Caster Rd. and Balfour St. Estimated cost $35,000. Noted Nov. 6.

R. I., Providence—M. A. Gammino Realty Co., 718 Valley St., will build a 2 story, 75 x 100 ft. repair shop and storage building, etc. at 727 Valley St. Estimated cost $50,000. O. DiSaia, 15 Westminster St., Archt. Work will be done by owner's forces.

Tex., Schertz — U. S. Government, A. W. Parker, Constructing Quartermaster, received lowest bid for the construction of a 1 story, 100 x 500 ft. garage for general auto and airplane repairing from R. E. McKee, 1916 Texas St., El Paso, $68,594.

Va., Richmond — Gulf Refining Co., Frick Annex, Pittsburgh, Pa., will soon award contract for a bulk oil storage building, distribution station, service garage, etc. here. Estimated cost to exceed $100,000.

W. Va., Charleston—Standard Oil Co. of New Jersey, Davidson Bldg., awarded contract for a 2 story, 28 x 86 ft. repair and service garage, etc. Estimated cost $100,000.

Wis., Eau Claire — Eau Claire Airways, is having plans prepared for a 60 x 100 ft. hangar and service shop. A. W. Bayer, Archt.

Wis., Racine—Bd. of Education, awarded contract for addition to shop for Center St. vocational training school. Estimated cost $40,000.

Wis., Superior—Common Council, plans the construction of a 1 story, 75 x 140 ft. garage and shop. Estimated cost $40,000.

N. F., St. Johns — Newfoundland Railway, awarded contract for the construction of a 60 x 140 ft. locomotive shop, 62 x 320 ft. machine shop and 39 x 270 ft. tender shop. W. F. Yoyce, Ch. Engr.

Ont., Hamilton—City, S. H. Kent, Clk., will soon award contract for a 3 story addition to machine and repair shops. Estimated cost $50,000. Noted Sept. 25.

Ont., Oshawa—Oshawa Industrial Foundation Ltd., c/o Chamber of Commerce, plans the construction of a 1 story, 100 x 150 ft. factory. Estimated cost $60,000. C. C. Stenhouse, Archt. Coulter Mfg. Co., c/o Coulter Copper & Brass Co. Ltd., 115 Sumach St., Toronto, lessee.

China, South Manchuria, Dairen—International General Electric Co., 120 Broadway, New York, N. Y. and Tokyo Electric Tokyo, Japan, plans the construction of an electric lamp manufacturing plant here. Estimated cost $1,500,000.